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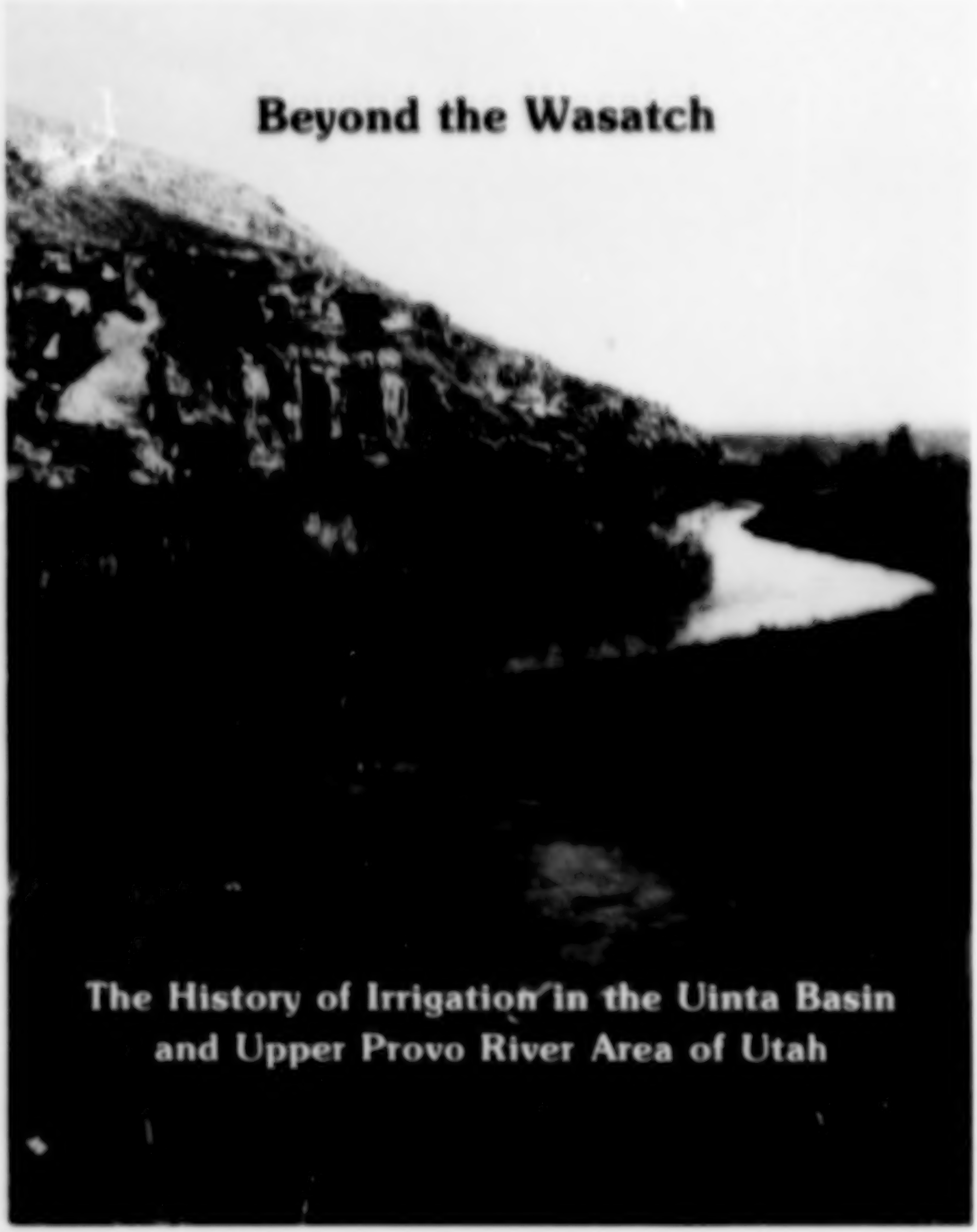

Beyond the Wasatch

The History of Irrigation in the Uinta Basin and Upper Provo River Area of Utah

BEYOND THE WASATCH:

The History of Irrigation in the Uinta Basin and Upper Provo River Area of Utah

Edited by Gregory D. Kendrick

Introduction by Charles S. Peterson

This history partially fulfills the Interagency Agreement Number 3AA-40-00900 between the Bureau of Reclamation, Upper Colorado Regional Office and the National Park Service, Rocky Mountain Regional Office.

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Cover Photograph: Rocky Point Canal
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PREFACE

It seems appropriate that the Bureau of Reclamation contributed to the preparation of *Beyond the Wasatch: A History of Irrigation in the Uinta Basin and Upper Provo River Area of Utah*. The Bureau of Reclamation and other Federal Agencies have long played active and often pivotal roles in the historical development of Northeastern Utah's Uinta Basin. The Bureau of Indian Affairs, U.S. Indian Irrigation Service, Department of the Army, as well as the Bureau of Reclamation helped to shape life within the Uinta Basin. Despite the Well-known assertion that the frontier process created self-reliant individualists, settlement of the semi-arid West most often created dependency and required cooperation. Settlement of the Uinta Basin proved no exception. Here settlers became critically dependent on water and often upon the Federal agencies which controlled this precious resource. Cooperation rather than individual effort punctuated the way of life and guided future development.

This publication represents one small part of this continuing Federal involvement. In 1983, the Historic American Engineering Record (HAER), a National Park Service program that produces archival documentation through measured drawings, photographs, and oral and written histories, was asked by the Bureau of Reclamation to conduct a historical and documentary study of an early 20th century irrigation system within the Uinta Basin. This complex irrigation network was partially financed by the U.S. Indian Irrigation Service. Portions of this historic irrigation system will be affected by the Bureau of Reclamation's Central Utah Project. This massive Bureau of Reclamation project involves the collection of water in the Uinta Basin and diverting the water to the Great Basin. The HAER study documents the construction and technology of the historic irrigation system before its alteration.

Fieldwork for the study began during the summer of 1983 when the National Park Service hired Craig W. Fuller (Utah State University), James A. Jurale (University of Wyoming), and David B. Stalheim (Evergreen State College) to trace the design and construction of the Uinta Basin irrigation system. Their on-site historical research continued through the summer and well into the fall of that year. The draft report indicated the necessity for additional background research to learn more about the critical role played by the U.S. Indian Irrigation Service in the Uinta Basin. Robert W. Righter, Professor of History at the University of Wyoming, and I examined the Bureau of Indian Affairs records within the National Archives, Washington D.C. pertaining to the Uinta Basin irrigation system.

The results of this fieldwork and research form the basis of the first two chapters of *Beyond the Wasatch*. The first chapter, "Prelude to Settlement: The Efforts of the U.S. Indian Irrigation Service in the Uinta Basin, Utah," traces the role of the U.S. Indian Irrigation Service. Created in 1906 as a part of the Bureau of Indian Affairs, the agency's primary purpose was to construct irrigation canals for reservation Indians located in the semi-arid West. The newly formed agency realized that the Uinta Basin could never sustain a self-supporting Indian community without intensive agriculture and that without irrigation, farming within the Uinta Basin had little hope for success. Within the next two decades the small Federal agency constructed an impressive irrigation system: 22 canals stretching for more than 162 miles, 635 laterals, and over 5,000 diversion and measuring devices. Eventually over 75,000 acres of Uintah Indian Reservation lands received water. Yet, if one measures the project's success in terms of the number of Indians who farmed this land, the mission of the Indian Irrigation Service clearly failed. The majority of irrigated land quickly fell into white ownership or control.

The second chapter, "Irrigation by Default: Settlement of the Ashley Valley and the Uinta Basin," describes how Mormon and gentile homesteaders capitalized on the existence of this under-utilized Indian irrigation system. Settlement of the Uinta Basin represented a carefully planned effort by the Mormon Church to colonize one of the last remaining agricultural frontiers in Utah. After portions of the Uintah Indian Reservation had been thrown open to settlement in 1905, Church leaders worked closely with Indian Irrigation Service Officials in the operation and expansion of the irrigation system. This cooperation often translated into Mormon maintenance of Federal canals in exchange for unused Indian water rights. By 1920, most Indian canals transported water to white farms.

Research in the Uinta Basin was followed by a second phase of fieldwork within the Uinta Mountains of northeastern Utah. Beginning in the summer of 1985, a second team composed of Robert W. Righter, Clayton A. Fraser (Fraserdesign, Loveland, Colorado), and James A. Jurale researched and photographed the high mountain reservoirs associated with the irrigation systems of the Uinta Basin and lower Provo River Valley.

These reservoirs usually constituted the second stage of growth for an irrigation system. During the first decades of the twentieth century Utah farmers built simple earth and stone dams on natural mountain lakes to supplement the natural storage capacity of their irrigation canals. Chapters three and four examine two such projects. Chapter three, "Expanding the System," traces the construction of storage reservoirs associated with the Uinta Basin Irrigation system. Chapter four, "Damming the Headwaters of the Provo River," chronicles the development of reservoirs high on the western slope of the Uinta Mountains to supplement the lower Provo River Valley water supply. These reservoirs facilitated modest agricultural expansion and helped to guarantee a more dependable supply of water during drought. Collectively, the two irrigation networks represent successful development of some of the last settled and least productive agricultural lands in Utah.

The Historic American Engineering Record narrative is supplemented with 348 large format, rectified photographs, 6 measured drawings, and 85 HAER inventory cards. The site plans and cover sheets graphically depict the two irrigation systems. The drawings were produced by Bonnie J. Halda and James A. Caufield, historical architects with the National Park Service's Rocky Mountain Regional Office. The drawings show only those historic canals and reservoirs which were determined eligible for listing in the National Register of Historic Places. The photographs of the canals were taken by Clayton B. Fraser. The contemporary photographs of the dams and reservoirs were taken by Clayton Fraser and Robert W. Righter. Several other individuals lent their time, energy, and support to this HAER project. Donald C. Jackson, formerly with HAER in Washington, D.C.; Charles S. Peterson, Professor of History, Utah, and Julie Corona of the Rocky Mountain Regional office in the National Park Service lent their expertise and assistance throughout the course of the project. Finally, de Teel Patterson Tiller and Katherine H. Stevinson, formerly with the Rocky Mountain Regional office, contributed their knowledge and support to this long term project. The HAER study was funded by the Bureau of Reclamation as part of its planning for the Bonneville Unit of the Central Utah Project.

INTRODUCTION

by Charles S. Peterson

This book deals with the development of water resources. Water, of course, has been one of the great factors in the growth of the American West. *Beyond the Wasatch* details the process by which water flowing from the southwest drainages of northern Utah's Uinta Mountains was put to human use. The story belongs primarily to the first half of the 20th century, although parts of it extend to both earlier and later times. The water involved rises within the State of Utah, and its utilization had implications mainly for Utah. Development involved native Americans and the settlement of a new country by Anglo-Americans. It also involved bureaucratic contributions, application of technology and capital, and utilization of the legal and social institutions of water control. The story told in *Beyond the Wasatch* could be told from the perspective of any of these themes, but as it is presented here, water itself is central. In maintaining its focus upon water, this account provides a new and useful "angle of vision" that sets it apart from most earlier regional histories.[1]

Throughout the arid West, mountains are crucial to development. Their elevations produce precipitation and streams, their flanks become roadways, and their valleys become farms and cities. At the very heart of the interior West, the Uinta Mountains have been a key to regional history. Unlike most Western mountains, they extend east and west. Rising to more than 13,000 feet, they stretch 200 miles, lying, on the one hand, like a great dam across the southwesterly tilt that the Colorado Plateau takes towards the sea. On the other hand, their west drainage penetrates the Wasatch Mountain rim of the Great Basin like the bunghole of a barrel.[2]

The Uinta Range played an important part in the semi-arid West during the century before the water development story told in this book began. Native Americans knew the Uintas as a resource, and, with varying regularity, the Utes, the Shoshones, the Comanches, and the Blackfoot Indians passed through them and wintered around them. With the advent of the white man, the Uintas became the motherlode of the first Intermountain fur trade as trappers and traders from St. Louis, the Oregon Country, and Taos converged after 1824. With their 200-mile east-to-west length, the flanks of the range became natural paths for America's westering migration. Through the Uinta Basin's passageway from the south came Spanish padres, Taos trappers, and influences from the Southwest. Along the north slope came the combined migration of the Oregon, California, and Mormon trails, and, later, the first transcontinental railroad.[3]

Well before Brigham Young dreamed of an independent economic commonwealth along the Wasatch Front, the first businesses of Wyoming and Utah were located in the environs of the Uintah Mountains. In the Uinta Basin, Forts Robidoux and Davy Crockett were established in the 1830s to trade with Indians and ship furs out via Santa Fe. To the north, Fort Bridger took advantage of Oregon Trail traffic and Indian trade to become one of the best known way stations of the West after 1843.[4]

However, for various reasons, frontier development bypassed the Uinta Mountains, and the locality became an Indian reservation and a producer of water for the more favored areas of settlement. Areas of Salt Lake and Provo valleys that depended in part on Uinta watersheds were put under irrigation as early as the 1850s. Yet, at that time and for several decades, the relationship of the Uinta Mountain watershed to irrigation and water rights in the valleys was understood only in the most general way. Need for additional water in territorial Utah continued to be critical, but economic conditions and the state of technological development made it unfeasible to settle the Uinta Basin for farming purposes or to conceive of and construct an irrigation system that would fully exploit the region's water.[5]

In no small part the problem was one of geography. From the Uinta Mountains, all water tends south and west through five major drainage systems. Looked at clockwise, beginning at the west point of the range, the Weber Basin drainages flow west and a bit north for about 150 miles to the Great Salt Lake. The Bear River rises from the range's northwest ramparts, plunges into Wyoming, and alternatingly meanders and cuts 250 miles in a wide loop through Idaho and Utah to the Great Salt Lake. The Green River drains the north and northeast, gathering in numerous affluents and flanking the east end of the range through Flaming Gorge and Brown's Hole into the Uinta Basin. There, the Green River picks up the combined waters of the Duchesne and Strawberry Rivers which rise primarily from the south drainages of the Uinta Mountains. The Provo River rises from the south and southwest portions of the Uintas and, merging with drainages from the Wasatch Range, makes its way south and a little west into Utah Lake and thence to the Great Salt Lake. In this total picture, 40 to 50 percent of the Uinta Mountain watershed flows under natural conditions to the Wasatch Front and Great Basin. The rest feeds into the Green River and ultimately through the Colorado River into the Gulf of California.

It is with the development of the south and southwest drainages of the Uinta Range that this study is concerned. Yet, to understand what happened on the upper Provo and Duchesne Rivers it is necessary to have some little sense of how water from the Uinta Mountains has been handled more generally. The Weber was put to irrigation purposes early. Scores of local cooperative associations diverted its flow and established an overlapping welter of claims. In 1901, one of the West's all-time success stories saw the Weber's East Canyon affluent dammed at a cost of $50,000, making water available to produce additional crops whose value exceeded the cost of building the dam in a single year. As the mid-20th century advanced, the Weber Basin Project built a series of upstream reservoirs, diked Willard Bay of the Great Salt Lake, and distributed industrial, domestic, and agricultural water throughout the basin in an undertaking that some students have adjudged to be only less striking in its success than the initial damming of East Canyon.

After 1860, the Bear River was partially controlled for irrigation purposes on a relatively local basis, with high country farming communities developing at Bear Lake and Cache Valleys, and farming ranches elsewhere along its upper reaches. In the years around 1900, what ultimately became Utah's richest farming region was opened primarily by speculative development in Bear River Valley where the stream approached the Great Salt Lake. For many years, the Green River remained largely beyond man's development, but with critical need, interstate compacts, Federal development, and much controversy, it was controlled by great reclamation projects in the decades after 1945 as a primary part of one of the West's large regional developments.

The lower Provo River, which carries water from the Wasatch as well as from the Uinta Range, was developed early and progressively. First, it contributed substantially to the needs of the Wasatch Front farms which comprised the agricultural heartland of territorial Utah, if not indeed the entire Intermountain region. Later, the Provo was harnessed to meet the urban and industrial needs of Salt Lake City and Provo. Utah Lake was recognized as "the proper reservoir" for Salt Lake City, and its waters became a bone of contention between farmers of Utah and Salt Lake Counties. By 1900, schemes were afoot to dike around the lake, divert water into it from the Weber River, and enlarge its practical capacity by pumping. More recent Federal projects drew from the Uinta drainage and are part of the story told in this book.*

By 1900, changes were underway that finally led to the full development of the Provo and Duchesne watersheds. In the first place, science and technology had advanced, making larger, more sophisticated water projects possible. The Federal government also made reclamation its business, and after 1902, poured vast economic and human resources into water development throughout the West. It was an era also in which private enterprise and state government became interested in irrigation, and speculative interest in water projects ran rampant among both financiers and the officials of state government.

Also a background condition of irrigation's development in the time around 1900 was a strong sense that Indian assimilation through introduction to white man's agriculture was the most promising prospect for solving what was widely known as the Indian problem.[7]

But perhaps more important in precipitating the half-century of water development described here was the fact that a great surge in agricultural settlement took place in areas with distinctly submarginal natural prospects. This movement was characteristic of much of the Intermountain West but was particularly strong in Utah. The pioneer period had passed. A population of about 300,000 had been established, and in both cities and rural communities, second-and third-generation Utahns looked for opportunity. Railroading continued to be a significant element in the State's economy, and mining and smelting were of major importance. Careers in education and the professions were also becoming a possibility, and what might be termed a "brain drain" was getting underway as many of the State's "best and brightest" took positions in the East and on the West Coast. Nevertheless, many continued to look to the land, and the first two decades of the century saw land settled at a rate never achieved before or since, as thousands of Utahns took up new farms and many immigrants arrived from elsewhere in the United States and even from as far away as the Jewish Pale in Russia.[8]

Implicit in the foregoing is the fact that five sets of actors participated in the development of the Duchesne and Provo drainages. Longest on the land were the Indians of the Ute and Uncompaghre tribes who numbered no more than 2,000 in 1900. Always a background factor, the Utes were allowed little opportunity to act in their own interest. Treaty and other paper rights had been spelled out, but were often observed more in the breach than to Indian advantage. Included among such formal provisions by 1908 were water rights. On paper, these were coterminous at least with the establishment of the reservation and perhaps extended from aboriginal times and were largely independent of the usual workings of prior appropriation and beneficial use.

Although a beginning toward giving Indian water rights real force was made in the Winters Decision of the Supreme Court in 1908, only the most limited of water initiatives were open to the Utes in practical terms. Utah was less aggressive in the processes by which it forced Indians from their original lands than some neighboring States, and Mormons long maintained a strong Indian missionary impulse. However, in the final analysis, Indians were dispossessed in Utah as elsewhere. Few whites concerned themselves with any question of Indian rights, much less with concern for rights as critical and hard to pin down as those pertaining to water. Indians themselves were reluctant to apply the white man's modes of irrigation and were slow in asserting their claims to water. Bureau of Indian Affairs officers and engineers understood that Indian rights to water were implicit in the policy of Indian assimilation and in the allotment of farms to individual Indians. But BIA officials were at least equally sensitive to the white rights implicit on the reverse or intermixing-of-cultures side of the assimilation/allotment coin. Ultimately, assimilation worked against Ute Indian rights to water, as it did against their rights to land, by introducing white claimants. Perceived need together with the doctrines of prior appropriation and beneficial use as developed in Utah law tended to be the effective arbiters of water distribution between Indians and whites. Viewed in this sense, it is obvious that while the Ute Indians were a continuing factor in the irrigation story told here, they had little chance to be actors in the real sense.[9]

While less numerous than the Indians, the personnel of several Federal agencies constituted a more active set of participants. The U.S. Forest Service was on the ground after 1897 and played an important role in allocating water rights and designating reservoir sites and ditch right-of-ways in the high country. After the initiation of the Strawberry Project in 1905, the Bureau of Reclamation was also a constant in the picture of Uinta water development, playing especially important roles in the diversion of water from the Weber and Duchesne Rivers into the Provo River as well as in the construction of the Deer Creek Reservoir and development of distribution systems to deliver the water in Utah and Salt Lake Valleys.[10]

Less well known but even more directly involved in the story told here was the U.S. Indian Irrigation Service which designed and constructed the primary south slope Uinta canal systems in the first decades of the 20th century. The emergence of the Indian Irrigation Service was an outgrowth of the West's general interest in irrigation and the assimilationist program that proposed to tutor Indians in the ways of agriculture. Indian agents, few of whom knew anything about irrigation and all of whom were busy, had made initial attempts at water development on some reservations during the 1880s. Successive agents looked scornfully at the failures of their predecessors and, with pathetic optimism, held forth their own puny efforts as successful resolutions to crucial problems. In the main, however, these early efforts to develop Indian irrigation failed.

Gradually, an arm of the BIA was set up to shift the burdens of irrigation development from the direct supervision of the agents. For example, on the Navajo Reservation a water and irrigation survey was made in 1892, likely as a response to the Powell Irrigation Survey of the public lands which was then underway. Soon after, irrigation specialists were appointed. One was Samuel E. Shoemaker. Designated the "Superintendent of Irrigation," he was assigned to the Crow Reservation in 1894, transferred to the Navajo Reservation in 1896, and to the Shoshone Reservation in 1900. He did much to improve the technical quality of Indian irrigation works and, on the Navajo Reservation at least, put together a master plan for water use which guided later development. Before 1910, regional Indian Irrigation Service offices were established at Albuquerque and Denver and perhaps elsewhere. From these headquarters, engineers were assigned specific field projects and until 1930, were a major force in irrigation development wherever Indians were involved. Like Shoemaker, many of them were commiited, capable people. They worked hard, fought for money, and tried to develop irrigation in unbelievably adverse situations.[11]

Another identifiable human element in the development of water were the settlers who migrated to Utah specifically to take advantage of opportunities in the Uinta Basin. This is an as yet uncounted group both as to its places of origin and its overall size, but it is safe to assume that it was of a size to add to the leaven of irrigation customers and practices and that many of its members came from neighboring states where established ideas and habits pertaining to water's utilization were part of the cultural milieu. Colorado and Wyoming, for example, had well-established irrigation institutions by 1900. The "Colorado Doctrine" was known for its rigorous defense of individual property rights through an almost absolute application of prior appropriation of water. Community interests were more recognized in Wyoming where a system of State control was set by 1890 with a State engineer to establish the physical dimensions of water, superintend its distribution, and provide data to a State water board which adjudicated disputes. Wherever they came from, Uinta Basin non-Mormons contributed to a tendency for local control, strong property rights in water, and individual initiative. However, lack of aggressive activity in the Uinta Basin on the part of speculative investors suggests that most of them were settlers of modest means rather than capitalists.[12]

A numerically larger set of participants and chronologically second into the Uinta watersheds were the Mormons. Initiating irrigation in July of 1847, pioneer Mormons quickly enunciated a natural resource policy of stewardship or usufructory utilization. Under this doctrine, private property rights yielded to ecclesiastical sanction and community interests. Applied to water, it enabled the concept of prior appropriation to function, but mitigated the near-absolute individualism of prior rights by stressing beneficial use principles not unlike the public benefit tenets of riparian rights under the common law as it pertained east of the Mississippi River. Practically, beneficial use stressed broad distribution of water's benefits over property rights, maximized profits, or speculative investment.

The Mormon Church was responsible not only for the values upon which this system rested but participated directly in water development and distribution. Committed to establishing an area of Mormon influence, early leaders planned and directed settlement of successive localities including the development of irrigation. Once a settlement was established, the central church usually left administration of water to cooperating associations of local users and shifted its support to pioneer efforts in new areas.

The resulting emphasis on broad distribution and local control was only partially altered by territorial and State provisions governing water distribution by 1900. Nevertheless, when the church capitulated on issues of polygamy and politics in 1890, Mormons "Americanized" their approach to agriculture with the result that speculative land and water development, debt financing, and market economies became far more common than previously. Statehood in 1896 brought an almost euphoric anticipation of new greatness. While the grandness of this new day largely escaped them, Utahns forged boldly ahead in mining, railroading, educational and professional training, and into an era of marginal land settlement of which the development of the south flowing Uinta watersheds was part.

The Mormon role in this process was twofold. On the one hand, second- or third-generation Utahns undertook to relive the pioneer myth that had grown up around the exploits of their fathers. For many of the rank and file this meant taking up new farms, creating local water companies, and building new communities. A few mixed speculative and Mormon community interests as they led out creating development companies, laying systemwide plans for waterworks, building dams, and generally playing a role that integrated Chamber of Commerce boosterism and traditional Mormon leadership. Often, as in the case of the Uinta Basin's Dry Gulch Irrigation Company, development leaders were regional Mormon leaders.

On the other hand, the central church continued to support new agricultural development. On northern Arizona's Little Colorado River, for example, local leader David K. Udall again and again won church subsidies in his long struggle to develop a successful water system. Short of the kind of subsidy given to the Little Colorado communities, the blessing of the church lent an important legitimacy among the Mormon rank and file to a project and helped mobilize the human force necessary for both resource development and perpetuation of the Mormon community.[13]

The influence of the Mormons and Utah looms large in the historiography of Western irrigation. This has been so since the inception of the Irrigation Congress movement about 1890 and continues to be so today. Although it makes the Utah irrigation story unrealistically one-dimensional, this historiographic treatment of the Mormons has been almost universally favorable. Mormons, it is held, initiated the first large-scale irrigation by Anglo-Americans and, applying modified doctrines of prior appropriation and riparian rights, created institutions and practices uniquely fitted for broad and peaceful utilization of the scarcest of all natural resources.

Beginning with the scientific radicalism of bureaucrat/surveyor John Wesley Powell's *Report on the Arid Regions of the United States with Special Emphasis on Utah* in 1878 and the promotional enthusiasm of William Smythe's *Conquest of Arid America* in 1903, this historiography had progressed by 1912 to the vast legal compilation of Clesson S. Kinney, *A Treatise on the Law of Irrigation and Water Rights and the Arid Region's Doctrine of Appropriation . . . ,* second edition, (San Francisco: Bender Moss Co., 1912). While grumbling is found about the role of Mormon senators or Utah-raised Bureau of Reclamation administrators in environmentalist literature like John Upton Terrell's *War for the Colorado River*, 2 volumes, (Glendale: Arthur W. Clark Co., 1965), recent literature continues to treat the Mormon influence favorably or at least to dignify it by including it in the highly selective topical irrigation treatments which by the 1970s had developed a clearcut thematic conventionality.

Important recent works that bear this out are as various as Arthur Maass and Raymond L. Anderson's seriously technical examination of seven worldwide water service areas, *. . . and the Desert Shall Rejoice: Conflict, Growth, and Justice in Arid Environments* (1978), Robert G. Dunbar's excellent historical account, *Forging New Rights in Western Waters* (1983), journalist Philip L. Fradkin's personal desert foray, *A River No More: The Colorado River and the West* (1984), and environmentalist/historian Donald Worster's pointed inquiry into the social and political tyranny implicit in the technical and financial discipline of Western water development, in *Rivers of Empire: Water, Aridity, and the Growth of the American West* (1985).

Each of these books is in its own right a remarkable work. Each tells the story of irrigation from its own perspective and establishes its own working propositions. In character and purpose, they are markedly different, yet each uses many of the same conventional stories to make its point and each must of necessity generalize about the irrigation episodes it draws together to build an argument. In addition to being a description of water related policy and institutions, or an argument based on them, each of these works is in its own way an intellectual production with a quality analysis that in subtle ways sets it apart from the physical reality of water and the technical works and social institutions by which water is actually put to work for man in the American West.

As one reads them, one is moved by an awareness of the shortcomings of generalizations. For example, one is keenly aware that Worster's portrait of a soulless, placeless concrete canal fails to reflect the full physical and social diversity of the "hydraulic West." Similarly Maass and Anderson's painstaking discipline in portraying irrigation in Utah Valley distorts the irrigated place as it enlightens one about the institutions of Mormon/Utah irrigation.[11]

Beyond the Wasatch, then, is offered not as an alternative to Worster or Fradkin, nor yet as a substitute for the conventional history of Western pioneer settlement. It is, however, presented as a necessary supplement to both kinds of literature. It is an account that puts water at the appropriate center of the historical development of one of the West's myriad drainage systems. It describes the role of five interacting sets of participants rather than a single dominant element. In addition, it presents a detail of situation and event which, multiplied by similar detail for other drainage systems, will provide the necessary raw material from which future works of systhesis may overcome a certain technical and legalistic dryness that in the past has put much water history beyond the interest of the reading public. A quality of the abstract that sometimes separates the work of intellect from the physical and social worlds of water is also mitigated by intimate examination. The authors and editors hope *Beyond the Wasatch* will make some contribution toward such ends.

ENDNOTES

[1] Donald Worster, *Rivers of Empire: Water, Aridity, and the Growth of the American West* (New York: Pantheon Books, 1985), suggests that placing water and aridity in focus provides "a radically new angle of vision" for viewing the historical significance of the West. Shifting from a pioneering focus to a direct consideration of water development certainly provides a new angle of vision for study of regional development in Utah.

[2] See J.W. Powell, *Report on the Geology of the Eastern Portion of the Uinta Mountains and a Region of Country Adjacent Thereto* (Washington, D.C.: Government Printing Office (GPO), 1876), and Ralf R. Woolley, *The Green River and Its Utilization*, U.S. Department of the Interior Water Supply Paper 618, (Washington, D.C.: GPO, 1930).

[3] For useful books that deal more or less directly with the Uinta Mountains, see Dale L. Morgan, *The Great Salt Lake* (New York: Bobbs-Merrill, Co., Inc., 1947); and Leland H. Creer, *The Founding of an Empire: the Exploration and Colonization of Utah, 1776-1856* (Salt Lake City: Bookcraft, 1947). Reference to contact period Indians of the Uinta region may be found in Brigham H. Madsen, *The Northern Shoshone* (Caldwell, Idaho: Caxton Printers Inc., 1980), and Madsen, *The Shoshone Frontier and the Bear River Massacre*, (Salt Lake City: University of Utah Press, 1985), as well as in mountain man accounts including Warren Angus Ferris, *Life in the Rocky Mountains: A Diary of Wanderings on the Sources of the Rivers Missouri, Columbia, and Colorado 1830-1835*, revised edition, (Denver: The Old West Publishing Company, 1983), and Osborne Russell, *Journal of a Trapper 1834-1843*, edited by Aubrey L. Haines, (Lincoln: University of Nebraska Press, 1965). The latter two are also good accounts on the mountain men in the Uinta Mountain vicinity as are Morgan, *The Great Salt Lake*, and *Jedediah Smith and the Opening of the West* (New York: Bobbs-Merrill Co., 1953); and especially David Weber, *The Taos Trappers: The Fur Trade in the Far Southwest, 1540-1846* (Norman: University of Oklahoma, 1971). On the Spanish padres see Herbert E. Bolton, editor, *Pageant in the Wilderness: The Story of the Escalante Expedition Through to the Interior Basin, 1776* (Salt Lake City: Utah State Historical Society, 1951), and *The Dominguez-Escalante Journal: Their Expedition Through Colorado, Utah, Arizona, and New Mexico in 1776* translated by Fray Angelico Chavez, edited by Ted J. Warner, (Provo: Brigham Young University, 1976). For the great trails that began to break up as they passed the west end of the Uintas, see George R. Stewart, *The California Trail: An Epic with Many Heroes* (New York: McGraw Hill Book Co., 1962); and Wallace Stegner, *The Gathering of Zion: The Story of the Mormon Trail* (New York: McGraw Hill Book Co., 1964).

[4] On trading posts, see Weber, *Taos Trappers*; Fred R. Gowans and Eugene E. Campbell, *Fort Bridger* (Provo: Brigham Young University Press, 1975); and Creer, *The Founding of an Empire*.

[5] On Utah settlement generally, see Hubert H. Bancroft, *History of Utah* (San Francisco: The History Publishing Co., 1889); Andrew L. Neff, *History of Utah 1847 to 1869*, (Salt Lake City: Deseret News Press, 1940); and especially Leonard J. Arrington, *Great Basin Kingdom: Economic History of the Latter-day Saints, 1830-1900* (Cambridge: Harvard University Press, 1958). And for overviews of Utah irrigation see George Thomas, *The Development of Institutions Under Irrigation: With Special Reference to Early Utah Conditions* (New York: The Macmillan Co., 1920); John Wesley Powell, *Report on the Arid Regions of the United States with Special Emphasis on Utah* (Washington D.C.: GPO, 1978), and Elwood Mead, *Report of Irrigation Investigations in Utah* (Washington, D.C.: GPO, 1903).

[6] The information in the preceding paragraphs draws heavily from Mead, *Report of Irrigation Investigations in Utah*, Charles Brough, Charles Hillman Brough, *Irrigation in Utah* (Baltimore: Johns Hopkins University Press, 1898); and from J.W. Powell, *Report on the Geology of the . . . Uinta Mountains . . .*, and Ralf R. Woolley, *The Green River and Its Utilization*.

[7] See Brough, *Irrigation in Utah*. George Dewey Clyde, "History of Irrigation in Utah" *Utah Historical Quarterly* 27 (January 1959) pp. 26-36. Donald Swain, *Federal Conservation Policy 1921-1933* (Berkeley: University of California Press, 1963), and Elmo Richardson, *The Politics of Conservation: Crusades and Controversies, 1897-1913* (Berkeley: University of California Press, 1962.)

[8] *Atlas of Utah*, Deon C. Greer, editor, (Provo: Brigham Young University Press, 1981) pp. 110-119. Robert A. Goldberg, *Back to the Soil: The Jewish Farmers of Clarion, Utah, and Their World* (Salt Lake City: University of Utah, 1986); Charles S. Peterson has dealt with land settlement in Utah during this period in "Foreward" to Goldberg, *Back to the Soil*, and elsewhere; as have Leonard J. Arrington and Thomas G. Alexander, *A Dependent Commonwealth: Utah's Economy from Statehood to the Great Depression* (Provo: Brigham Young University, 1974), especially chapter 2.

[9] For early years on the Ute Reservation, see Floyd A. O'Neil, "A History of the Ute Indians of Utah Until 1890" (Ph.D. Dissertation: University of Utah, 1973) and James W. Wardle, "Reluctant Immigrants of Utah: The Uncompahgre Utes" (M.A. Thesis: Utah State University, 1976). On the Winters Doctrine, see N[illegible]ndley, Jr., "The Dark and Bloody Ground of Indian Water Rights: Confusion Elevated to P[illegible]iple [illegible]estern Historical Quarterly*, 9 (October 1978) pp. 455-482, and Hundley, "The Winters' Dec[illegible]n and Indian Water Rights: A Mystery Reexamined" *Western Historical Quarterly*, 13 (January 198[illegible] 24. On assimilation and allotment policies see Francis Paul Prucha, *The Indians in American Society: From the Revolutionary War to the Present* (Berkeley: University of California Press, 1985); Prucha, *The Great Father: The United States Government and the American Indians*, 2 vols. (Lincoln: University of Nebraska Press, 1984) especially chapters 24-35, and Wilcomb E. Washburn, *The Assault on Indian Tribalism: The General Allotment Law (Dawes Act of 1887)* (Philadelphia: J.B. Lippincott Co., 1975). For a specific account of assimilationist allotment in action, see R.R. Cotroneo and Jack Dozier, "A Time of Disintegration: The Coeur d'Alene and the Dawes Act" *Western Historical Quarterly* 5 (October 1974) pp. 405-419.

[10] On the Bureau of Reclamation in Utah, see Thomas G. Alexander, "An Investment in Progress: Utah's First Federal Reclamation Project, The Strawberry Valley Project" *Utah Historical Quarterly* 37 (Summer 1971) pp. 254-264, Keith D. Wilde, "Defining Efficient Water Resource Management in the Weber Drainage Basin, Utah" (Ph.D. Dissertation: Utah State University, 1975), Richard W. Sadler and Richard C. Roberts, "History of the Weber Basin Project," a book-length manuscript done for the Weber Basin Water Conservancy District now being considered for publication, and David Merrill, et. al., "An Historical Mitigation Study of the Strawberry Valley Project, Utah" (Orem, Utah: Mesa Corporation under contract with the Bureau of Reclamation, 1982.

[11] S.E. Shoemaker, "Report to the Commissioner of Indian Affairs" March 19, 1900. (Richard Van Valkenburgh Papers: Arizona Historical Society); Charles S. Peterson, "Homestead and F[illegible] History of Farming at the Hubbell Trading Post National Historic Site" (Manuscript prepare[illegible]thwest Parks and Monuments Association, 1986) chapters 3, 5, and 6; also see Richard W[illegible]e *Roots of Dependency: Subsistence, Environment, and Social Change Among the Choctaws, Pawnees, and Navajos* (Lincoln: University of Nebraska Press, 1983).

[12] Evidence of settlers from surrounding States is apperent in the Uinta Basin newspapers of the era. Evidence of the relatively small amount of investment interest in the Uinta Basin is apperent from a comparison of newspapers from southwestern Utah along the track of the San Pedro, Los Angeles and Salt Lake Railroad where land and water projects were vigorously promoted by a changing procession of investment companies, many of which had Midwestern connections.

[13] See Arrington, *Great Basin Kingdom*; Thomas, *The Development of Institutions Under Irrigation*; Brough, *Irrigation in Utah*; Meade, *Report of Irrigation Investigations in Utah*; James Hudson, *Irrigation Water Use in the Utah Valley, Utah*. (Chicago: University of Chicago Department of Geography Research Paper No. 79, 1962); and Charles S. Peterson, *Take up Your Mission: Mormon Colonizing Along*

the Little Colorado River, 1870-1900 (Tucson: University of Arizona Press, 1973) chapter 8, and Charles S. Peterson, "Water Rights on the Little Colorado River: Background and Development During the Pioneer Period, 1870 to 1910" in "A Historical Study of Non-Federal Water Claims in the Little Colorado River Basin, Arizona" (Central States Development, Inc., 1986) pp. 1-1 to 1-63.

[10] Worster, *Rivers of Empire*, pp. 4-5, and Arthur Maass and Raymond L. Anderson, ... *and the Desert Shall Rejoice: Conflict, Growth, and Justice in Arid Environments* (Cambridge: Massachusetts Institute of Technology Press, 1978) pp. 325-364.

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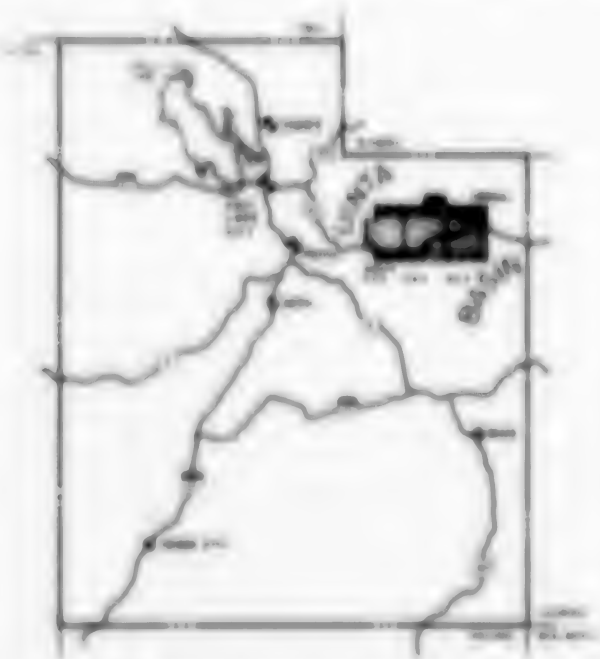
HISTORIC IRRIGATION CANALS OF THE UINTA BASIN



UTAH SHOWING A PORTION OF THE UINTA BASIN

SETTLEMENT OF THE UINTA BASIN, BEGINNING IN THE 1870s AND STRETCHING INTO THE 20TH CENTURY, REPRESENTED A CAREFULLY PLANNED AND PRAGMATIC EFFORT OF THE MORMON CHURCH TO COLONIZE ONE OF THE LAST REMAINING AGRICULTURAL FRONTIERS IN UTAH. CONDITIONED BY EARLIER COLONIZATION EFFORTS THROUGHOUT THE GREAT BASIN KINGDOM, THE MORMON CHURCH FULLY UNDERSTOOD THE IMPORTANCE OF IRRIGATION FOR THE INITIAL SUCCESS AND ULTIMATE SURVIVAL OF THEIR SETTLEMENTS IN THE UINTA BASIN. THE COMPLEX SYSTEM OF HISTORIC IRRIGATION CANALS EXISTING IN THE BASIN TODAY LARGELY REFLECTS THE KNOWLEDGE, SKILLS, AND COMMITMENT OF THESE 20TH CENTURY LATTER-DAY SAINTS. THE MAJORITY OF THE IRRIGATION CANALS WERE CONSTRUCTED, OPERATED, AND MAINTAINED BY TWO LARGE ORGANIZATIONS: THE MORMON CONTROLLED DRY GULCH IRRIGATION COMPANY AND THE UNITED STATES INDIAN IRRIGATION SERVICE'S UINTAH BASIN PROJECT.

THIS PROJECT WAS UNDERTAKEN BY THE HISTORIC AMERICAN ENGINEERING RECORD (HAER) OF THE NATIONAL PARK SERVICE'S ROCKY MOUNTAIN REGIONAL OFFICE, IN COOPERATION WITH THE UPPER COLORADO REGION, BUREAU OF RECLAMATION, UNDER THE DIRECTION OF HISTORIAN GREGORY D. KENDRICK (NATIONAL PARK SERVICE). THIS PROJECT WAS COMPLETED DURING THE SUMMER OF 1985 AT THE HAER FIELD OFFICE, DUCHESNE, UTAH, BY PROJECT SUPERVISOR CRAIG W. FULLER (BRIGHAM YOUNG UNIVERSITY), PROJECT HISTORIANS DAVID B. STALHEIM (THE EVERGREEN STATE COLLEGE) AND JAMES A. JURALE (UNIVERSITY OF WYOMING), PROJECT ARCHITECTS JAMES A. CAUFIELD AND BONNIE J. HALDA (NATIONAL PARK SERVICE), AND PROJECT PHOTOGRAPHER CLAYTON B. FRASER (LOVELAND, COLORADO).

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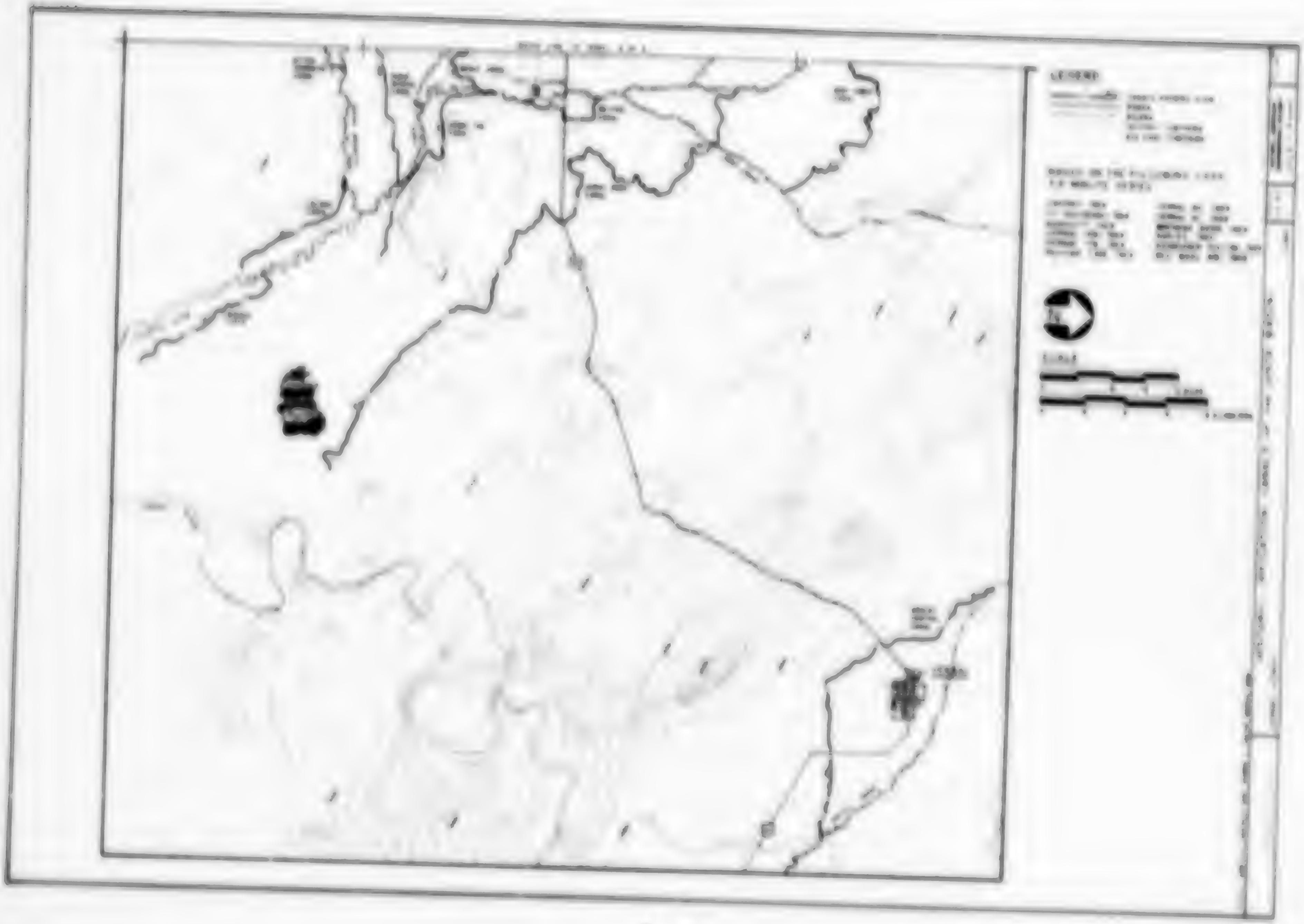

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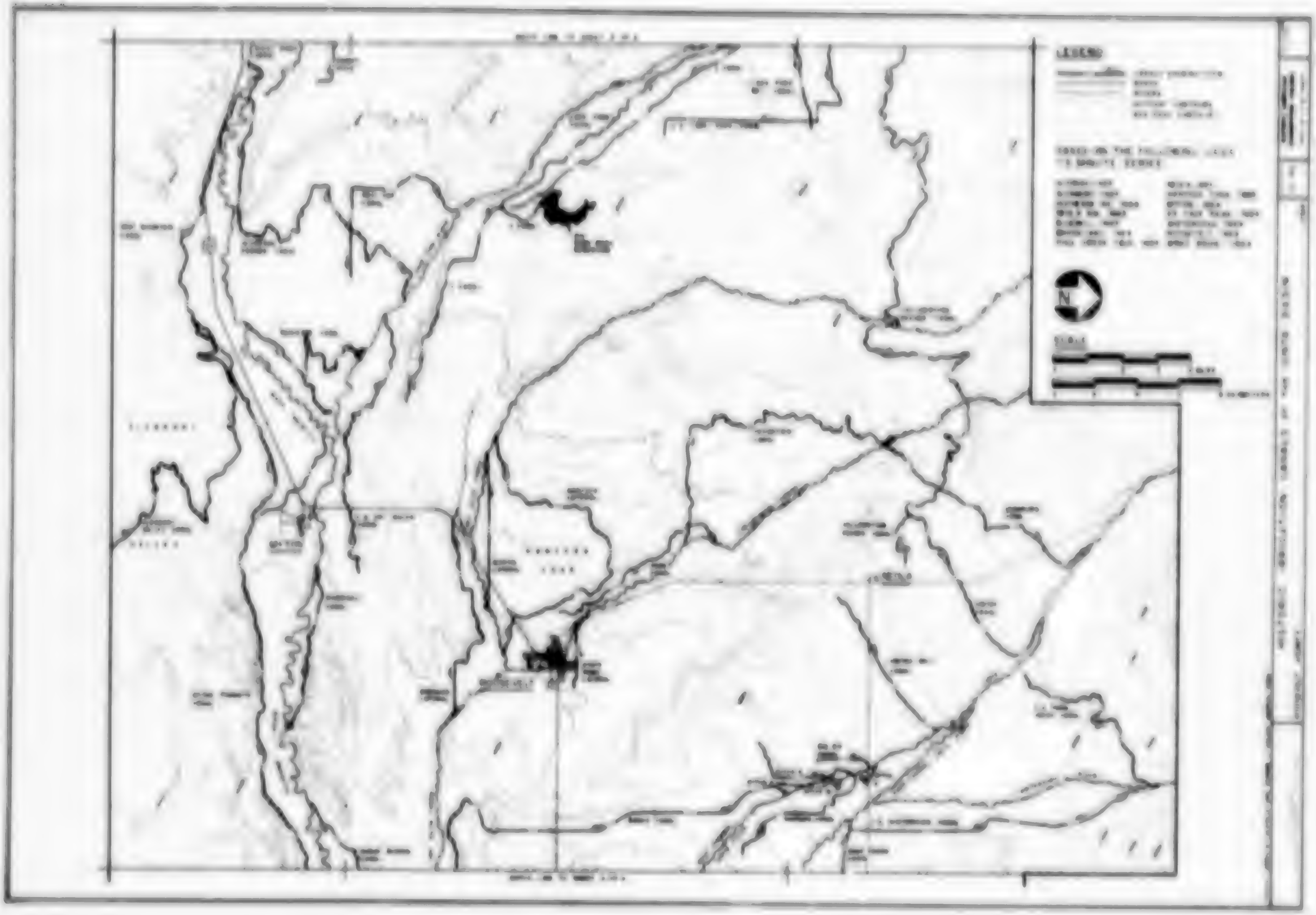
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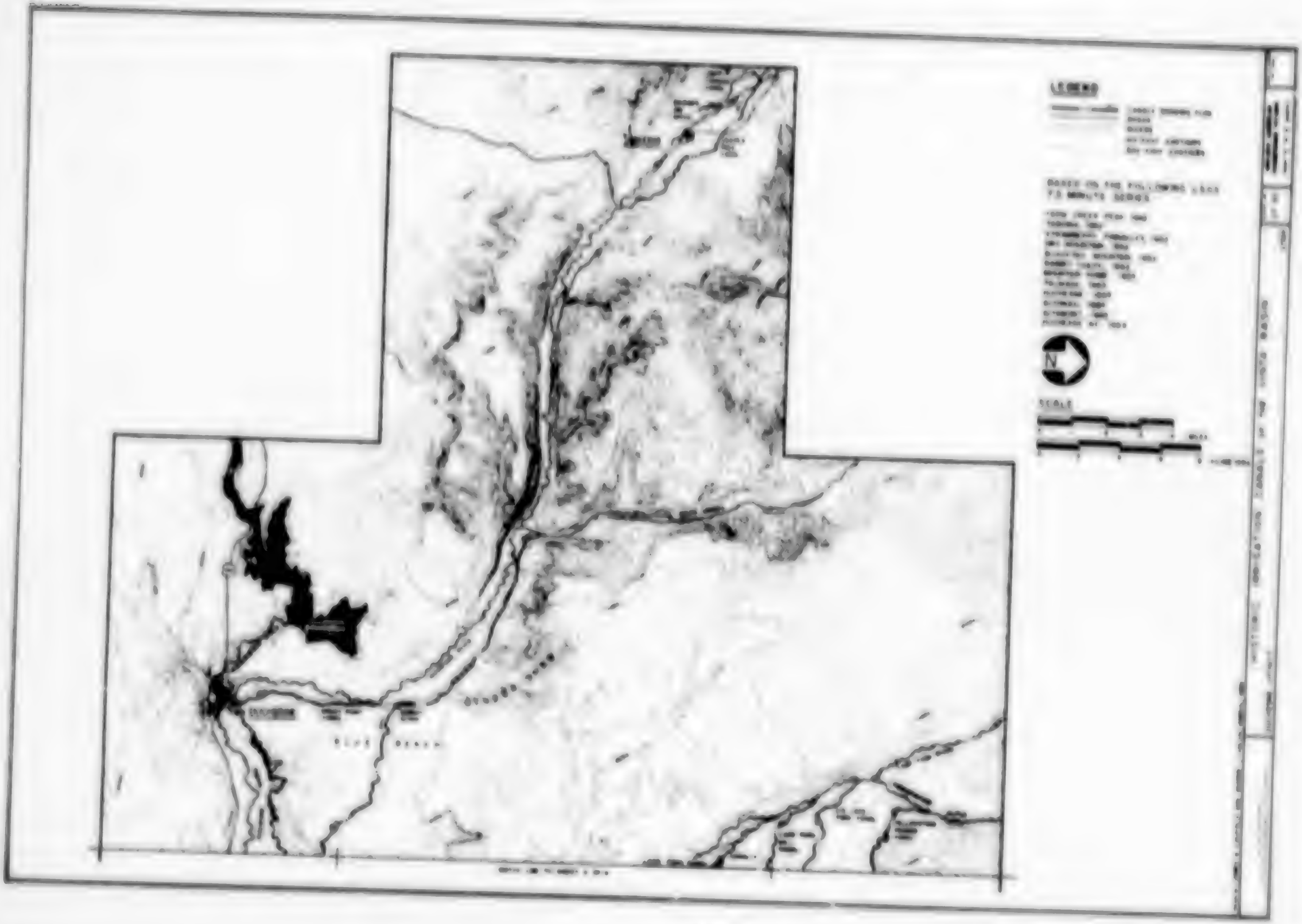
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CHAPTER ONE

PRELUDE TO SETTLEMENT: THE EFFORTS OF THE U.S. INDIAN IRRIGATION SERVICE IN THE UINTA BASIN, UTAH

By Craig W. Fuller, Gregory D. Kendrick, and Robert W. Righter

Men dressed in their Sunday best and women shading themselves with parasols from a warming August sun pressed close to a makeshift stand leaning against one side of the Proctor Academy in Provo, Utah. A small group of men and teenaged boys clustered on the stand, sheltered from the morning sun by the stand's canvas roof. A large wooden drum stuffed with white envelopes containing the names of prospective homesteaders stood near the front of the temporary stand. As the hour drew closer to 9:00 a.m. on August 17, 1905, the crowd of more than a thousand grew increasingly restless. At precisely 9:00 a.m., a signal was given to one of the boys to pull the first envelope from the wooden drum. The envelope was then handed to one of the men standing nearby and was opened. The name of Roy Daniel of Provo, Utah, was read aloud to the anxious crowd.[1]

The long-awaited opening of the Uinta Indian Reservation had begun. For weeks, assorted homestead seekers, comprised predominantly of Mormons but including numerous gentiles, had crowded the hotels and rooming houses in Provo, Price, and Vernal, Utah, as well as Grand Junction, Colorado, awaiting this day. All hoped their names would be drawn early and thereby provide them with an excellent opportunity to select the best lands in the Uinta Basin.[2]

The much publicized opening of the Uintah Indian Reservation drew considerable interest, both within and outside the State of Utah. By August 11, 1905, 16,271 people had arrived in Provo, Utah, to order to register for the right to enter the reservation and select homesteads. By August 16, most homesteaders had found their "ideal" homestead and were back in Provo, awaiting the luck of the lottery. (Photograph courtesy of the Utah Historical Society, entitled "Drawing Lots for Uintah Land Opening August, 1905.")

In many ways, the Uinta Basin land rush represented the convergence of not only cultures but policies. While the Mormon settlers viewed the land rush from their particular cultural milieu, the Bureau of Indian Affairs (BIA) officials, both in Washington, D.C., and on the reservation, looked upon the proceedings within the framework of a broad policy of assimilation of the American Indian. Whether the policy was a wise one is a question that has long occupied the attention of historians of Indian policy. It continues to be the subject of debate and scholarly study. This narrative will attempt to place the development of Uinta Basin water within the context of national policy objectives. For the moment, it is enough to say that the above-described land lottery of Indian lands was not unique. In this same year of 1905, land was opened on three other large western reservations—the Crow, the Flathead, and the Wind River.

With regard to white settlement, however, the Uinta Basin land rush represented a marked departure from the typical frontier pattern where speculators, adventurers, drifters, and other assorted frontiersmen scrambled frantically for 160-acre homesteads. Settlement of the basin represented a carefully planned and pragmatic effort of the Mormon Church to colonize one of the last remaining agricultural frontiers in Utah. Conditioned by 5 decades of colonizing efforts throughout the Great Basin Kingdom, the church fully understood the importance of irrigation for the initial success and ultimate survival of their settlements in the Uinta Basin. The complex system of irrigation canals existing in the basin today reflects the knowledge, skills, and commitment of these early 20th-century Latter-day Saints. But perhaps more importantly, it also demonstrates the crucial role played by a small and relatively unknown Federal reclamation agency. The U.S. Indian Irrigation Service would prove indispensable to Mormon irrigation plans in the Uinta Basin. The Indian Irrigation Service had developed a large, albeit underutilized, irrigation system years before the first Mormon farmer received his 160-acre Uintah Indian Reservation land allotment. Although conceived and built to convey water to future Ute farmers, the completed irrigation system found very few Indian farms ready to receive water. The Mormon Church capitalized on the existence of this Federal irrigation system and surplus Indian-owned water. By the end of the decade, water flowing through Indian Irrigation Service canals would irrigate both Mormon and Indian lands.

The roots of the rush for Uinta Basin lands can be traced to October of 1861, when President Abraham Lincoln issued an Executive Order establishing the Uintah Indian Reservation under the jurisdiction of the BIA and the U.S. Army. The presidential proclamation and a subsequent 1864 congressional act to "vacate and sell the present Indian Reservations in Utah Territory and to settle the Indians of said Territory in the Uintah Valley," effectively relocated the Ute from their traditional homelands in the Great Basin. The newly created reservation, encompassing 2,039,040 acres of land, stretched from the crest of the Wasatch Mountains on the west, to the Sand Ridge on the east, and from the summit of the Uinta Mountains on the north, to the top of Tavaputs Plateau on the south.[3] It was a diverse estate, one which included alpine lakes and meadows, fine stands of timber, vast tablelands, and buttes. These tablelands were separated generally by a series of benches, and it was on these arid benches that the Uintah Irrigation project had its location.[4] This expansive reservation, however, was the home for not only the Uintah Indians, but for other bands of Ute Indians. In 1875, as a punishment for their participation in the Meeker massacre, the White River Ute Indians were located on the reservation. In 1882 the Uncompaghre Ute band received the northwest corner of the Uintah Reservation.[5] Certainly, however, there was adequate room if the original reservation had remained intact. But the allotment program of 1905 almost halved the acreage.

The establishment of the Indian reservation, of course, did not necessarily coincide with Mormon plans for the Uinta Basin. Following the practical Mormon policy of exploring an area before attempting settlement, Brigham Young ordered a small reconnaissance of the basin in August 1861. Political as well as spiritual motives prompted the expedition, as Young later recorded, "I have been requested several times to permit settlement of that valley (Uinta Basin), but I have never wished to do so until now; but now I want a settlement there and I wish to pick the company. The Gentiles will take possession of that valley if we do not, and I do not wish them to have it.'"[6]

By September 1861 the exploration party had returned to Salt Lake City and reported their findings to the church hierarchy. Their report was less than glowing, and found an area "entirely unsuitable for farming purposes . . . . It was one vast 'contiguity of waste,' and measurably valueless excepting for nomadic purposes, hunting grounds for Indians and to hold the world together."[7] This report, in combination with the establishment of the reservation, prompted Young to postpone any immediate colonization plans. As a consequence, the first attempts at irrigation within the Uinta Basin were undertaken by the BIA within the Uintah Indian Reservation.

UINTAH IRRIGATION PROJECT

In exchange for relinquishing their traditional hunting lands according to the terms of the 1857 Spanish Fork Treaty, the Ute were to receive Government annuities and assistance in the development of farms.[8] The BIA's efforts coincided with a growing national concern for the fate of the American Indian. During the last decades of the 19th century, Federal institutions, including Indian boarding schools such as the Haskell Institute, Kansas, privately sponsored conferences such as the Mohonk Conference, New York, and outspoken individuals like Helen Hunt Jackson championed assimilation as the only answer to the West's Indian problem. The adoption of agriculture by the Indian was perceived as one of the primary means to this end. The BIA realized that without irrigation, few Indian farming efforts west of the 100th meridian and within the Uinta Basin could hope for success.

Between 1865 and 1899 an estimated 14 Indian canals of various lengths were constructed under the auspices of the BIA. The reservation superintendent supervised the construction of these ditches which carried water to small scattered Indian farms located adjacent to basin streams.[9]

The importance of water to the economic and cultural development of the reservation was made abundantly clear by Indian Agent Robert Waugh. In a November 1891 letter to the Commissioner of Indian Affairs, Waugh argued for the construction of an irrigation ditch, stating that "the object and effect of such ditch is first to supply the school premises with the needed water and second to give farming lands near and induce the Indian to locate in that vicinity that they become farmers and support their school." Certainly the marriage of the Indian to both white farming and education was one of the primary hopes of assimilation policy. Therefore, Waugh's proposal was approved. So convinced was the agent of the necessity of irrigation to the school's success that in a postscript he advised that "if the ditch can't be built, don't let out the building contract for the school."[10]

Although clearly in the forefront of 19th-century Indian water development, the BIA was by no means the only party interested in diverting water to Indian farms in the Uinta Basin. Mormons constructed at least one of these early canals as part of their ongoing missionary efforts among the Utes. The church hierarchy had a vested interest in converting and making farmers of the Utes. According to the *Book of Mormon*, the American Indian was a remnant of the tribe of Israel who had been cursed with dark skin and banished to struggle in darkness. Yet prophecy told of the eventual return of the Indian to the Christian faith. Mormons, therefore, viewed the Ute as souls to be saved, much as they were perceived earlier by Jesuit and Franciscan missionaries in the Southwest.[11] Brigham Young believed that teaching the Indians to farm was integral to their missionary activity and to the Utes' ultimate redemption. Both the Mormon Church and the BIA shared the conviction that the Utes should be taught farming. The church, however, remained convinced that their twofold mission to instruct the Utes in agriculture and in the *Book of Mormon* was generally superior to the efforts of the BIA. Neither Federal or ecclesiastical mission, of course, necessarily translated into an enlightened attitude toward the reservation Indians.

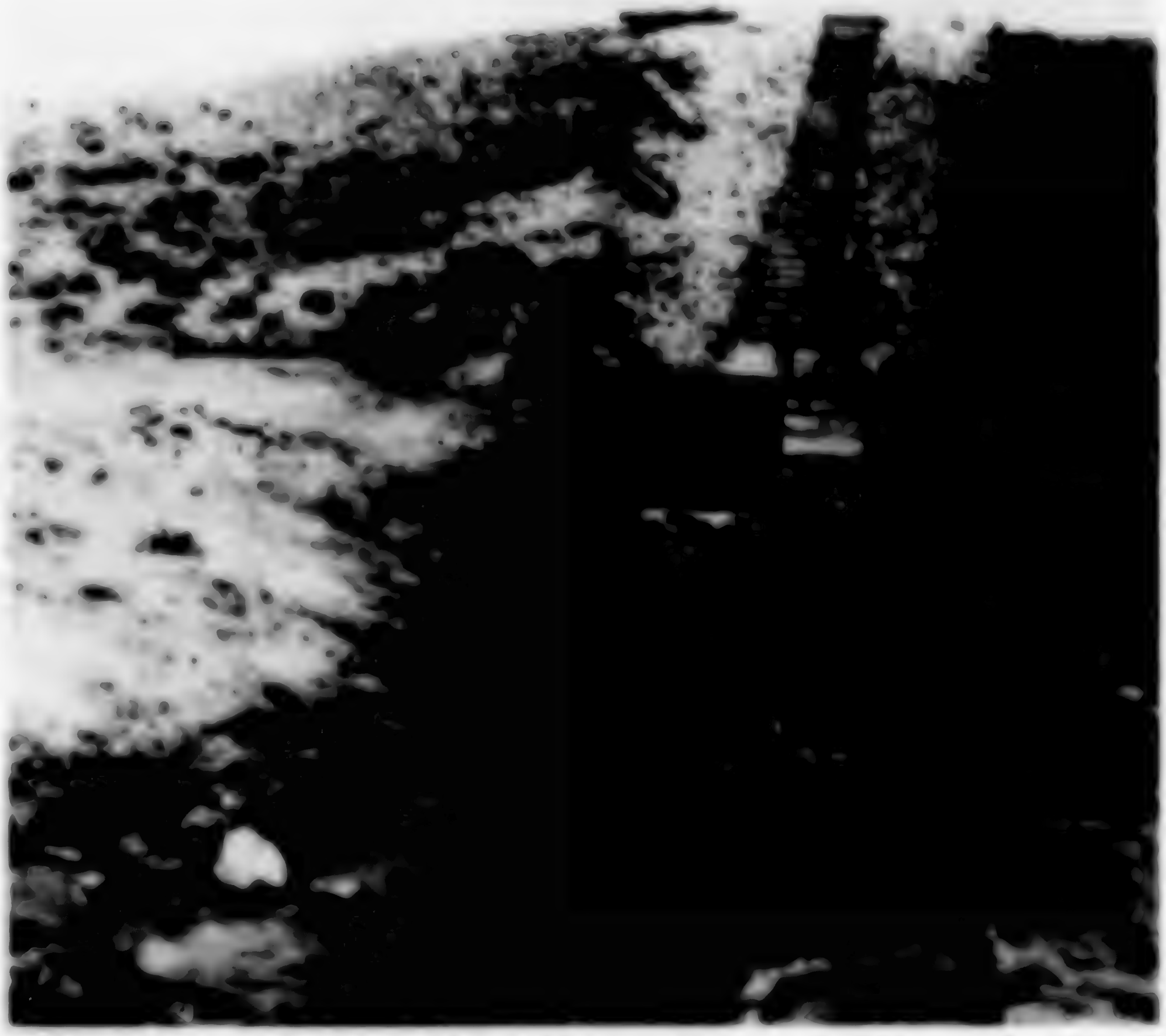
Andrew Jenson, historian for the church, chronicled Mormon missionary activity in the Uinta Basin at the turn of the century. As one might expect, he regarded Mormon irrigation projects highly, while disparaging governmental efforts. Describing their work, he recorded that in 1883 "the missionaries assisted the Indians to make a canal [about 15 miles below the present site of Fort Duchesne] over a mile long, below the mouth of the Uintah."[11] "The canal project undertaken by the brethren proved a success," the church historian continued, " and in 1892 there was quite an Indian settlement under this canal. Israel J. Clark had charge of the construction work." On the other hand, Jenson continued, "a canal three miles long, which the government had made for the Indians between Green and White Rivers had proved a failure."[12]

Colonel Randlett, Acting Indian Agent, supervised construction of Uintah Number One Canal in 1897. The canal originally irrigated Indian bottomlands. Later, the Dry Gulch Irrigation Company enlarged the canal, and in exchange received the right to jointly use the canal with the Utes. (Photograph courtesy of Uintah and Ouray Reservation Office, Fort Duchesne, Utah, hereafter referred to as Fort Duchesne.)

Perhaps in response to these Mormon allegations, Congress in 1899 sponsored a Federal investigation of water supply and irrigation in the Uintah Indian Reservation. Headed by Cyrus C. Babb, the investigation corroborated Jenson's assessment of the first irrigation canals on the reservation. Babb's report, entitled "The Water Supply of the Uintah Indian Reservation," noted that the 5-mile-long Uintah Number One Canal was "practically worthless, and the $20,000 which were used in its construction are virtually wasted [sic]." The canal, due to poor design and general mismanagement, was responsible for accelerated soil erosion along its length. Moreover, the canals, including Canal Number One, Bench, Henry Jim, Ouray School, Gray Mountain, U.S. Dry Gulch, Ouray Park, North Myton Bench, Lake Fork Ditch, Red Gap, and the South Myton Bench canals, irrigated but a fraction of their combined potential. Canal Number One, for example, provided water to a scant 100 acres of Indian land. His report concluded that the Indian canals irrigated only 3,000 acres of reservation lands, stretching from Tabiona Valley to Ouray.[13]

Undaunted by these dismal findings, Babb recommended that Congress appropriate additional funds for construction of an improved irrigation network. Linking irrigation to the successful assimilation of the Utes, Babb explained, "agricultural lands are dependent upon the construction of canals . . . . These agricultural areas are, however, practically valueless and cannot be allotted to the Indians for their support until irrigation works are built."[14]

Specifically, Babb recommended constructing an additional 75 miles of irrigation canals within the Uintah Reservation. One canal in the proposed system (later named the U.S. Lake Fork Canal when constructed in 1906) would divert water from the Lake Fork River to the land immediately west. Babb, assisted by A. L. Fellows, a civil engineer from Denver, Colorado, estimated the costs of such a canal at $6,760 for the first 1.5 miles which traversed rugged terrain and $1,500 for the remainder along level bench lands.[13]



The first water flowed through the U.S. Lake Fork Canal in [illegible]. The canal was designed by the Indian Irrigation Service to irrigate [illegible] acres of Indian lands. Wooden chutes such as this were needed to traverse the rugged terrain. (Photograph courtesy of Fort Duchesne, [illegible].)

Babb's pleas struck a responsive chord in Congress. During the last decades of the 19th century, a Federal reclamation movement led by John Wesley Powell, William Smythe, Elwood Mead, and others had generated national publicity and captured the attention of Congress. Powell's classic and influential "Report on the Lands of the Arid Region" (1878) stressed the necessity of irrigation and large storage reservoirs west of the 100th meridian. Passage of the Carey Act in 1894 and the Reclamation Act in 1902 reflected the growing Federal commitment to reclaim arid lands and thereby encourage agricultural development of the western states.[14]

Babb's recommendations coincided with a growing congressional commitment to divide tribal lands into small irrigated Indian farms. Land hungry frontiersmen formed one vociferous group which lobbied effectively for Western reservations to be partitioned and for the remaining unclaimed lands to be opened for white settlement. A second constituency, composed of Eastern humanitarian societies such as the Indian Rights Association, just as eagerly sought partition in order to speed assimilation of reservation Indians. Pressured by these two strangely disparate groups, President Grover Cleveland signed the Dawes Severalty Act on February 8, 1887. The Act provided that reservation land was to be allotted to individual Indians and the surplus opened to white settlers.

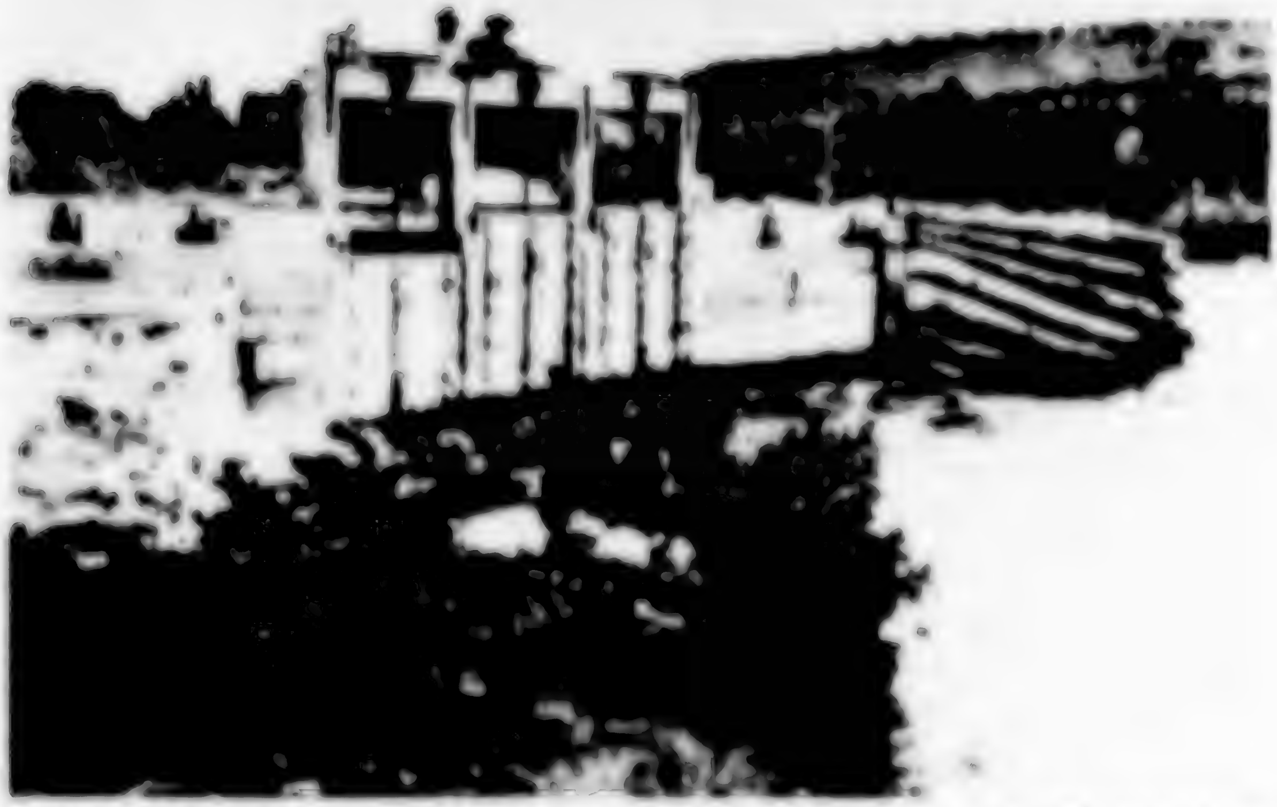
The Dawes Act, however, stipulated that a majority of the Indians on a reservation must agree to the allotment plan. Obtaining a majority was usually difficult and often impossible. In Utah, Irrigation Division Engineer W.H. Code had fair success with the Uintah Indians, but obtaining consent of the White River Ute was impossible, for as he wrote the Secretary of the Interior, "they are always rounding up bands of wild ponies and branding their colts, an occupation which they have more interest by far than the selection of allotments."[11] In truth, most reservation Indians did not understand the concept of allotment, and those that did found the notion unappealing. Often an agent had to make assumptions that the Indians within his reservation favored allotment. In 1903 the decision in the Supreme Court case of *Lone Wolf v. Hitchcock* made such assumptions unnecessary, for the Court stated that Congress no longer had to obtain approval of the tribe for land cessions.[12]

Congress now supported the point of view that allotment of land, even if opposed by the reservation Indians, must go forward. Futhermore, contrary to the original Dawes Act, such allotments could be leased or sold to whites, the theory being that the presence of white settlers would accelerate the assimilation, or civilizing, process.[13] Interestingly enough, on the Uintah Reservation not only would Indian and white land be adjacent, but there would be a commingling of Indian-owned and white-owned water in jointly owned canals—a confusing prospect at best, tragic at worst.

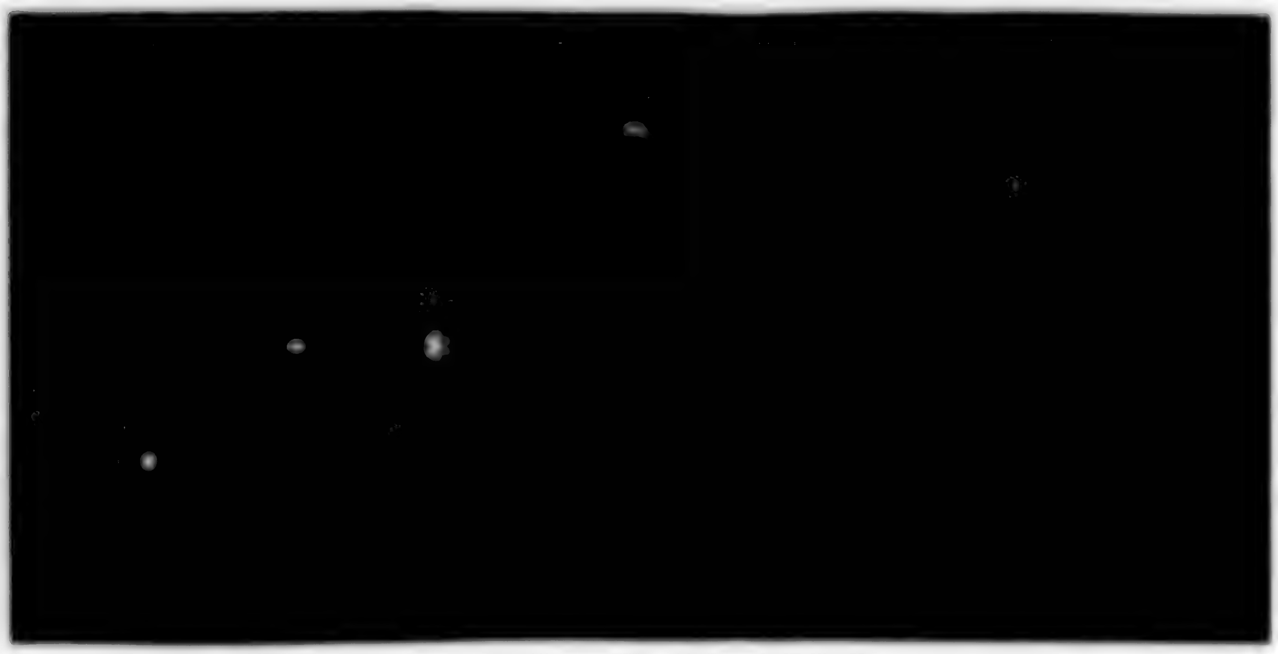
As the number of irrigation projects increased, so did the need for an agency to oversee construction work on the reservations. Following the recommendations of the Babb report, Congress provided for two superintendents of irrigation in 1900. Six years later, Congress established the United States Indian Irrigation Service. As part of the BIA, the agency's primary responsibility was to construct and operate irrigation canals for Indians located on reservations in the arid West. By so doing, the BIA hoped to promote economic self-sufficiency among Native American tribes. The Uintah Indian Irrigation Project, as part of the U.S. Indian Irrigation Service, was authorized to "construct irrigation systems to irrigate the allotted lands of the Uncompahgre, Uintah, and White River Ute in Utah."[14] The newly formed agency calculated that approximately 75,000 acres could be eventually irrigated given their estimated construction budget, the existing Indian water rights, and the amount of tillable land remaining after allotment.[15]

The Indian Irrigation Service moved quickly to establish a project office in the small town of Whiterocks. Here a project engineer supervised a staff including a junior engineer, three surveyors, one hydrographer, a clerk, and a supervisor of ditches who monitored the progress of about 20 ditchriders.[16] Employing standardized plans and specifications, the project would involve construction of 22 canals stretching for more than 162 miles, 635 miles of laterals and sublaterals, and over 5,000 primarily wooden structures (brush and rock dams, timber cribs, flumes, headgates, weirs).[17] Lumber used in the original construction of the irrigation network came from the Indian Timber Reserve in the Uinta Canyon and Dry Gulch. The lumber was sawed to specifications at the tribal sawmill near Whiterocks.[18]

Although originally intended to provide income to Indian laborers, construction of the irrigation project largely benefited white homesteaders. Crews in which Mormon farmers predominated contracted with the U.S. Indian Irrigation Service to construct, rehabilitate, and maintain the complex irrigation system. The income derived from the construction work helped to carry some Mormon farmers through their first years in the newly opened settlement area. According to the chief engineer of the Indian



The U.S. Lake Fork Canal diverted 163 second-feet of water through its 29,630 foot length. The canal was 28 feet wide at the top 17 feet wide at the bottom and had an effective depth of 1.5 feet. Water was diverted from the Lake Fork River through wooden headgates with ball bearing lifts. (Photograph courtesy of Fort Duchesne, date unknown.)



H.C. Means, Superintendent of Irrigation for the Uintah Indian Irrigation Project was responsible for the preparation of plans and specifications for structures such as this headgate for the Jasper Pike Ditch. (Photograph courtesy of Fort Duchesne, 1910.)

Irrigation Service, this Federal income often made the difference between success and failure to many Mormon families. Returning from a 3-month inspection tour of irrigation projects in the North and Middle West, he reported, "without the opportunity afforded many of the settlers to work upon the Indian canals, and the gratuitous use of surplus irrigation waters from the said canals allowed to many, it is difficult to imagine how the majority of these homesteaders could have obtained the bare necessities of life."[illegible] Ute workers, on the other hand, gained little from the expensive construction project. By 1908 Indians had received less than $7,000 (2 percent) of the $330,000 which had been expended on the irrigation project.[illegible]

Total cost for the Uintah project when first authorized in 1906 was not to exceed $600,000, with $125,000 immediately made available to begin construction of new Indian canals and to rehabilitate existing irrigation facilities.[illegible] Much like the Reclamation Act of 1902, which financed projects through the disposition of public lands, Congress intended Indian irrigation projects to be largely self-supporting and to be reimbursed through the sale of ceded Ute Reservation lands. The U.S. Treasury first advanced the Indian Irrigation Service construction costs and required later repayment from the "Proceeds of Uinta and White River Ute Lands" account of the Indian tribal fund. Operating costs of the Indian irrigation system were to be apportioned upon the lands irrigated with white and Indian water users sharing expenses. The Utes were required to begin payment for the operation and maintenance of the irrigation system once they became "self-supporting" or within 30 years.

White settlers, on the other hand, did not pay these construction costs until submission of final proof on their homestead entry. Homesteaders, therefore, paid the usual minimum fees and commissions at the time of their entry and paid $1.25 per acre when submitting their final proof 5 years later. All lands remaining unsold after 5 years from date of entry would be sold and disposed for cash at a minimum price of 50 cents per acre. By 1917, sales of unallotted Indian lands had generated $608,830. Unfortunately, construction costs totalled $915,000.[illegible] The difference between land sales and irrigation project expenses forced an uneasy recognition by Congress and the BIA that the Uintah irrigation project would not be self-supporting in the near future.

The proposed construction of an expensive irrigation system, tied as it was to the sale of Indian lands, triggered legitimate concern for the preservation of Indian water rights. Babb stated as much when insisting in his report that "the grants of water be of such a character that the rights of the Indians be at all times easily enforceable."[illegible] Congressional authorization for the 1899 irrigation study of the Uinta Basin also reflected a concern for the protection of Indian water rights by providing that "all such grants shall be subject at all times to the paramount rights of the Indians on said reservation to so much of said water as may have appropriated, or may hereafter be appropriated or needed by them for agricultural and domestic purposes." The authorization further provided that "it shall be the duty of the Secretary of the Interior to prescribe such rules and regulations as he may deem necessary to secure to the Indians the quantity of water needed for their present and prospective wants, and to otherwise protect the rights and interests of the Indian and the Indian Service."[illegible] A.C. Tonner, Acting Commissioner of Indian Affairs, shared Congress' fear that Indian lands and water would be appropriated by white farmers in the near future. Over the past decade, he had witnessed Indian rights quickly slip into the control of white settlers. Addressing Congress, Tonner warned that "the experience of the past has shown that while the rights of the Indians may be theoretically superior, practical enforcement through white officials is extremely difficult."[illegible]

From the time of allotment in 1905 until 1922, Government agents, engineers, and the Uintah Indians fought a State of Utah water rights system which was stacked against them. Moreover, the Babb irrigation study itself appeared to encourage appropriation of Indian water by authorizing the diversion of water through the reservation "for useful purposes."[illegible] In many instances, the effort of whites to obtain reservation water actually preceded allotment. On the western side of the reservation, illegal canals had been constructed. On the eastern side, settlers crowded against the reservation and then applied for the right to divert water. Fairly typical was George Bason's notification in 1892 to the Secretary of the Interior that he was constructing a ditch to bring water from Deep Creek across reservation land to his property. Bacor reasoned that no harm was being done as this was water which would "otherwise go to waste as the water is not used for any purposes on the reservation."[31]

Limited water and parched earth caused decisions that might later be questioned. The primary decision—or perhaps capitulation—was a congressional act which required that the reservation Indians would have to prove "beneficial use" of water under the laws of the State of Utah. The Act of June 21, 1906, provided that all Indian Irrigation Service "systems be constructed and completed and held and operated, and water therefore appropriated under the laws of the State of Utah." The 1906 Act was by no means an isolated congressional decision. The 1906 Act mirrored a 1905 congressional statute which required Wind River Reservation irrigation projects to file under Wyoming State law. Two later congressional statutes relating to the Fort Peck and Blackfeet Reservations confirmed the BIA's formative policy to file for water under State laws. While there were certainly sufficient reasons for following Utah water law, in retrospect it was a mistake—a mistake that committed the BIA to 15 years of struggle—in which the BIA was forced to sell or lease large portions of irrigable Indian lands to white settlers in the Uinta Basin.[32]

On June 13, 1905, C.G. Hall, Indian Agent at the Uintah Indian Reservation filed for and received the right to appropriate water from the Whiterocks River. When completed, the U.S. Deep Creek Canal stretched for 5,600 feet, was 26' wide on top, and 10-feet wide at the bottom.

What was the alternative? At the turn of the century the lines of authority regarding water remained unsettled. Uncertainty may be the best description of the State of Utah's right to extend water law to Indian reservation land. In the 1899 case of *United States v. Rio Grande Dam and Irrigation Company*, the Supreme Court of the United States determined that "the Federal Government retained or reserved the right to use as much water as it needed to develop its lands, a right that was superior to those sanctioned by the States and territories."[35] Since it was generally acknowledged that the Federal Government held the land in trust for the Indians, surely this decision could be applied to Indian reservation lands.

Two prominent government officials believed that the Uintah Reservation Indians owned the water without the necessity of proving beneficial use. Frederick Haynes Newell, a mining engineer with more experience in Western water measurement than any other American, surveyed the Uintah Reservation water and land resources in 1899. He worked for the United States Geological Survey (USGS), headed by Charles Walcott. In his report to Walcott, Newell expressed his belief that all the water flowing from the Uinta Mountains to the south belonged to the reservation. Furthermore, he suggested that "all waters rising within the Indians' reservation should be held for the use of the Indian lands, although in the aggregate these lands may far exceed the area which can be cultivated by the present occupants of the reservation."[36]

Following Newell's lead, USGS head Walcott recommended to the Secretary of the Interior that if surplus water did exist on the reservation, a value should be placed upon this water and it should be *sold*. The most logical water to sell was on the most easterly river, the Whiterocks. Using a price of $2,500 to $4,000 per cubic foot of continuous flow, Walcott figured the worth of the water rights to the river to be "a minimum of $107,000."[37]

Both Newell and Walcott subscribed to the idea that the reservation water belonged to the Indians and that they were not mandated to prove beneficial use, that is, using the water directly for irrigation of land. Furthermore, they did not believe the Indian water right was dependent on use (the "use it or lose it" principle). The water could simply be reserved for future use. Eight years later, in 1908, this idea gained legal stature in the Supreme Court case of *Winters v. United States*. In this landmark case involving the Fort Belknap Reservation in Montana, the Court declared that Indian reservations have a reserved or implied water right. Basically, the reservations were established so that the Indian might turn to farming. In the West, water was necessary for successful farming; therefore, the Indian reservations had a reserved right to water which would take precedence over prior appropriation of water by white farmers. And, of course, there would be no time limit upon reservation water to prove beneficial use. The Winters Doctrine, as the Court decision came to be known, has been crucial in establishing Indian water rights in the 20th century.[38]

The Winters decision did not have an immediate effect on the Uintah Reservation, however, for the Indian Irrigation service had committed itself to the June 21, 1906 Act. Yet in 1910, the Acting Indian Agent, Capt. C.G. Hall, wrote the Assistant U.S. Attorney, William McCrea, regarding the Winters decision and the Uintah Reservation. McCrea responded that he did not believe that the Winters case would affect the reservation because it was clearly under the State of Utah water law. However, McCrea continued, "personally, I have felt that the Department of Indian Affairs made a mistake in making these appropriations under the State laws." He felt that "the Government has . . . . yielded its jurisdiction over the waters." He regretted that the BIA agents had not contacted his office earlier, or that Congress had not made a "sweeping reservation of such waters . . . prior to the opening" of the reservation to white entry.[39]

In retrospect, the Indian Irrigation Service made a serious mistake by failing to follow the advice of Newell and Walcott. In a difficult and nebulous legal situation the Federal agency chose a path of least resistance. Had they followed the position of reserved water rights, they likely would have incurred the wrath of white settlers, the Utah congressional delegation, and State officials. Legal action surely would have been part of the State scenario. Yet the Winters decision would have greatly strengthened the reservation position and possibly provided the precedent for victory. However, this is mere speculation. More concretely, it can be contended that, in 1905, Commissioner of Indian Affairs Frances E. Leupp was not as aggressive or creative as he might have been in securing Indian water rights on the Uintah Reservation.[40]

The BIA decision to file under Utah State law precipitated a hectic scramble for the limited water within the Uintah Indian Reservation. Initially, the BIA had little trouble establishing prior water rights for the Indian land allotments. The problem was that it was necessary to perfect these water rights through "beneficial use." Simply put, to receive a permanent right to the water, the water must be conducted to the land and be used in a beneficial way, that is, for agricultural production. Of course, if the water was not used, it could be lost. Therefore, within a 5-year period of time, the owner of an Indian allotment had to prove he was putting his water allocation to beneficial use, otherwise he could lose that right, it being assigned to another farmer.

Proving beneficial use of Indian water allocations proved to be an extremely challenging job for the Indian Irrigation Service. Since many Indians cared little about water rights or husbandry, nor was it their custom to do so, some chose land which was impossible to irrigate or cultivate. When Irrigation Division Engineer W.H. Code made the allotments, he bemoaned the fact that while the fertile land and irrigable tracts were on the high plateaus, the Indians preferred to locate their allotments (80 acres for each head of household and 40 acres for each Indian) near the streams. Much of the area chosen was "interspersed with areas and ridges of rocky soil which would discourage any New England farmer." Some of the allotments were nothing but a "huge bed of boulders," and would never be farms.[41] How could the water allocation for such land ever be put to beneficial use?

The Indian Irrigation Service had to perform two difficult tasks. First, it had to conduct water to the Indian allotments by constructing ditches and to develop a general irrigation system. Engineers figured a formula of $8 per acre, times 75,000 acres, equaling $600,000. This amount was appropriated by Congress in 1906, and work proceeded immediately.[42] Second, it had to see that on each parcel of land the water was put to beneficial use. The BIA agents worked assiduously to perfect water rights.

From 1906 on, BIA agents understood that many, if not most, of the Indians would not prove up on their water rights, simply because they had little knowledge of, or interest in irrigated farming. At first, Indian Agent Capt. C.G. Hall favored a colony scheme which featured leasing the land to white farmers. Perhaps the BIA could advertise in regions where there was a surplus of farmers, "such as, for instance, Pennsylvania and other eastern states." Hall realized such a colonization effort would be "novel in the experience of the Department," but he believed it was essential.[43]

In his letter to the commissioner, Hall continued by asking a crucial question of why the Government should go to so much trouble to secure for the Indians water rights which they did not seem to want. His answer was that "the present generation of Indians will not live always," and by securing water rights the Governemnt will retain homes for future generations who may wish to farm. "If they lose the water right, they will have nothing."[44]

The idea of advertising was rejected, but the Government did attempt to lease Indian lands to white settlers. As might be expected, this plan was not very successful. "The idea of leasing is evidently not popular with the Mormon element," reported one BIA engineer. The Mormon farmers wanted to own the land and the water, and were making every effort to do so.[45]

At the State level, the idea of beneficial use was reaffirmed but not aggressively applied. In 1909, Utah State Engineer Caleb Tanner agreed to a 5-year extension for beneficial use to be proved. A State law then extended the proof period from 5 to 8 years.[46] These agreements and changes gave the BIA agents a considerable grace period in which to establish beneficial use by Indians, effectively postponing the date from 1911 to 1919.[47] Certainly, the Indian Irrigation Service needed all the time it could get. Not only did they encounter disinterest to farming by the Uintah Indians, and particularly the White River Ute, but white settlers and their irrigation companies were becoming more aggressive in their water demands. These companies were successful in obtaining rights to divert water, often further upstream, on rivers such as Lake Fork, Uinta, and Whiterocks. Once they had constructed the ditches, they often followed the "law of the highest user," that is, they paid little attention to downstream water rights. In the words of a formal 1922 report on the situation, "Upper stream filings usurped the rights of prior filings, as the different ditch companies raised and lowered their head-gates at will, with the result that the Indians suffered."[48]

Furthermore, outright destruction of Indian irrigation ditches, headgates, and valves was common in 1913. Superintendent of Irrigation H.W. Deitz complained to his superior that holes had been bored in headgates locked by the ditchrider, lifting devices had been removed with a wrench, fences had been built to prevent ready passage for the rider, and ditches had been constructed across Indian land without permission. In his opinion, there was a "general contempt for the Indian and the Government and a tendency to run roughshod over the two in an endeavor to crowd them out if possible."[49] A few years later, Assistant Inspector of Irrigation F.R. Schanck and Engineer Joseph Bryant could not see any improvement. There had been "flagrant trespass upon various Indian allotments by ranchers," and locked headgates had been "forcibly broken." Prosecution of such crimes seemed impossible, for "the Whites of this country are 'against the government.'" Furthermore, "the inadequateness of employing Indian police to enforce laws among whites is apparent to any one familiar with the West."[50]

During the first decades of the twentieth century, ditch riders, living in cabins such as this one on the Lake Fork Canal, fought a continuous battle to prevent vandalism along the canal right-of-ways.

In spite of such opposition, the BIA pressed its campaign to perfect water rights. Albert H. Kneale, an experienced Indian agent, was assigned this unenviable task in October 1914. Traveling by rail, Kneale and his wife arrived in the small company hamlet of Watson, Utah, on Christmas evening. Immediately after dinner, the newly married couple endured a bone-chilling 60-mile stage ride from Watson to Fort Duchesne, arriving at the post at 7:30 a.m. Kneale later recorded his initial impression of the small isolated Indian reservation and their new home. The veteran Indian agent remembered that "I was sick at heart. What a place to bring a newly acquired wife! What a journey! What a day! What a country! I knew that the successive events of the past twenty-four hours could have none but a depressing effect upon her. I knew that heretofore she had no idea that the world possesses such a railroad, such a hotel, such a stage route, such weather conditions, such a day, such an utterly inaccessible corner, such a dwelling and in such a condition." Kneale concluded, "I could not have blamed her had she said, 'Tomorrow, we retrace our steps to civilization.'"[51]

Despite the inauspicious beginning, Kneale proved to be an apt choice as superintendent for the Uintah and Ouray Indian Reservations. In a relatively short period of time, he familiarized himself with the current status of Indian water rights. Although the BIA and Indian Irrigation Service had filed on enough water to irrigate over 75,000 acres and constructed a complex irrigation system of canals and laterals, Kneale soon discovered that "practically nothing had been done concerning the matter of the third essential—the matter of putting the water to beneficial use. That is to say, practically no land had been placed under cultivation."[illegible] Kneale thus confronted the challenging prospect of placing nearly 75,000 acres of Indian lands under cultivation within 4 years. Failure to do so would result in the forfeiture of the Indian water rights. When Kneale made some preliminary queries to his Washington superiors as to his chances at proving beneficial use, he quickly "learned that no one connected with the Bureau had the slightest expectation of any successful outcome."[illegible]

Within a short period of time, Kneale had determined that little assistance in showing beneficial use would come from the Utes. Despite their grazing reserve, nearly 100,000 acres of choice agricultural lands, and an existing irrigation system, he found the Utes "chose to do practically nothing. Instead their lives were spent in almost total idleness. About the most arduous task they understood was gambling."[illegible]

Ditch rider's roads like this one paralleling the U.S. Whiterocks Canal provided ease of access for maintenance and regulatory work.

Given this perspective, Kneale quickly resurrected the colonization plan. Indian allotment land sales and leasing would drive the program. Several flyers were designed and published for distribution among potential white farmers. One flyer praised the potential of the Uinta Valley, stating that the Irrigation Service had spent "nearly one million dollars on our irrigation system." The brochure sounded as if the Indian population was of secondary concern when it stated that "there are only about 1,100 Indians left in this tribe and one can readily see that there is much surplus land, hence we are offering these lands for sale and for lease on very remarkable terms."[illegible] In reality, the main interest of the

Government was to lease or sell Indian allotments, allowing white farmers to prove beneficial water use and thereby prevent the loss of Indian water rights.

White settlers found the terms of the land sales hard to resist. Indian allotments were offered for sale at $12 to $20 an acre "with a perfectible water right." The BIA required that potential buyers first submit a sealed bid with a certified check containing 10 percent of their bid amount. These sealed bids were then opened at 2:00 p.m. at Fort Duchesne on the day of the sale. Winning bidders paid an additional 15 percent of the purchase price within 30 days from the date the Indian landowner accepted the offer. The new landowner was then responsible for paying the remainder of the purchase price in three annual payments. In 1915, 6,000 acres of Indian allotments were sold. The following year the BIA advertised an additional 12,000 acres for sale.[56] By 1920 more than 18,000 acres of Indian land had been sold to white homesteaders.[57]

The liberal terms of the sale, however, later proved to be an embarrasing and expensive mistake. The vast majority of land sale advertisements and contracts contained a "paid-up" water right provision. As a consequence, many new white landowners argued that they could not be held liable for the construction charges associated with the irrigation project. An opinion by the U.S. Attorney General rendered on September 2, 1921, supported the contention that construction costs could not be collected from anyone who had purchased Indian allotments prior to May 1, 1920. The oversight proved costly. By February 14, 1920, the BIA had finalized 382 land sales containing 18,740 acres. Construction costs to bring water to these farm lands totaled $235,778. Yet this money could never be collected from the new white landowners.[58]

The BIA leasing program proved even more popular with white homesteaders. Taking a chapter out of the ubiquitous real estate boomer literature of the West, the BIA praised its leasing proposition. Promotional flyers promised 40 acres of "choice agricultural land" and "free use of the land and of water appurtenant thereto for five full seasons." To further attract prospective homesteaders, the BIA promised to supply the posts, wire, and staples for fencing their leased land. All the BIA asked in return for its generous offer was "that you farm the land in a husband-like manner, thus making beneficial use of the water appurtenant thereto." A testimonial from a man named Grand Rasmussen followed, concluding with the challenge: "Show me another place in this wide world where a man can do as well."[59]

As might be expected, the brochure did not tell all. It failed to note the elevation was responsible for cold winters and a short growing season, and that only crops of a hardy nature could be grown on the Uintah project. Furthermore, there was no mention that, as in most desert regions, the soil lacked humus resulting in disappointing crops during the first few years. In fact, given a letter from the superintendent of the reservation to the Commissioner of Indian Affairs, dated February 1, 1915, the BIA could be accused of deliberate deception. In the letter, Superintendent Kneale revealed that "we offer a prospective lessee 40 or more acres of raw, rough sage-brush land, devoid of fences, ditches and buildings, land that requires immense toil and months of delay before any return whatever may be expected." Finally, the letter also acknowledged that "The first year of the lease there are no returns. The second year their returns are next to nothing. The soil is wholly lacking in humus and this must be supplied before crops can be successfully grown."[60]

Even if the hardy farmer was successful in growing cash crops, the long distance from market and the lack of an accessible railroad limited the crops to forage and grain that could be fed to livestock. Successful husbandry would be no easy matter on the Uintah Reservation.

In spite of such difficulties, the liberal terms of the leases attracted many farmers. Indeed, the advertisement generated considerable interest from farmers both within and outside Utah. During the height of the campaign, Kneale's office received 500 inquiries a day and was forced to hire three additional stenographers to handle its correspondence.[61] By 1919 a total of 1,764 leases had been drawn up, covering approximately 54,000 acres of land.[62] The critical time had come to perfect the water rights.

This historic photograph of the U.S. Whiterocks Canal shows the condition of the land prior to irrigation. The canal provided water to the Indian ranching and farming community of Whiterocks. The site of the farmland was selected by Pardon Dodds, Indian Agent from 1867-1872. (Photograph courtesy of Fort Duchesne, undated.)

Although great progress had been made, the Indian Irrigation Service had not perfected all beneficial use water rights nor diverted water to all farm lands.

H.W. Deitz, Supervising Engineer of the Indian Irrigation Service, petitioned the Fourth Judicial District Court of Utah for an extension until January 1921, and it was granted.[63] With a rather herculean effort, this deadline was met. Although BIA officials feared the Utah State Engineer would question many of the proofs, this was not the case and water rights were perfected for some 77,195 acres of white and Indian land under the Indian irrigation system.[64]

By all outward measurements, the accomplishment of retaining the water rights on Indian land was remarkable. However, if the battle was won, certainly the war was still in question. If the objective of all this manipulation was to assimilate the reservation Indians by remolding them into farmers, it was difficult to claim success. After all, 23,108 of the total 77,195 acres were owned by whites. The majority of the remaining Indian-owned land was leased to whites. Few reservation Indians actually farmed the land. As historian Frederick Hoxie has written, the leasing program subverted the original purpose of allotment. A Federally-subsidized Indian irrigation network exacerbated the situation by making the Indian lands even more attractive to white homesteaders. As a consequence, Indian land and water quickly shifted into white ownership or control. Native Americans, having little motivation to farm or become self-sufficient, did little to prevent the rapid erosion of their land and water rights. Possessing few reasons to modify their traditional cultural patterns, the Utes generally remained isolated from the non-Indian farming communities which gradually encircled them.[65]

The leasing program proved a bittersweet experience for the superintendent of the Uintah Indian Reservation. Kneale revealed his bitter frustration as superintendent when he wrote, "nor did my ability to lead the Ute into paths of industry and sobriety increase with the passing years. About the only thing that seemed to increase was the feeling that I had really accomplished very little of real value and was now accomplishing nothing."[66] Disappointed and disillusioned, Kneale quietly resigned from the BIA in January of 1923.

The same administrative problems which beset the Uintah Irrigation Project plagued other irrigation projects throughout the West. By 1914, the Indian Irrigation Service had irrigated nearly 600,000 acres on 56 reservations. Yet Indians farmed only 100,000 acres of the total. As early as 1913, the BIA conceded that too many projects had been constructed too quickly. By that time, however, most of the irrigation systems were already in place. The Secretary of the Board of Indian Commissioners, F.H. Abbot, blamed the Government for failing to provide the reservation Indian with the necessary financial support and technical training to become farmers. As a consequence, surplus land that could be irrigated quickly fell into white hands.[67]

To compound the problem, construction costs for the Indian irrigation project soon outpaced the revenues from the sale of Indian lands. Within 5 years, the original congressional idea of a self-supporting Indian irrigation project had evaporated as ceded Indian land sales fell far short of meeting construction costs. By the end of 1910, Congress had appropriated $675,000 for the construction of the irrigation system, yet the sale of ceded Ute lands had generated only $250,000. Moreover, most white settlers who had purchased Indian allotments prior to May 1, 1920, were not liable to pay construction costs which had accrued prior to the date of their purchases. On the Uintah Reservation, the Indian tribal fund usually made up these financial imbalances. The actual source of these tribal funds is often difficult to trace. However, in 1913, the Confederated Ute Bands won a claims settlement of more than $3 million for earlier ceding a portion of their Colorado reservation to the Federal government. The fund was earmarked for "industrial" improvements of which irrigation work was one of the BIA's "most important activities." In all likelihood, this monetary award allowed the Uintah Irrigation Project to continue.[68]

The situation was repeated on other Western reservations. By 1914, approximately $9 million had been expended for the irrigation of Indian lands. Indian tribal funds eventually reimbursed the U.S. Treasury for nearly $7 million of this total.[69]

Clearly, Mormon farmers benefited most from the irrigation system designed and built to promote agricultural self-sufficiency within the Uintah Indian Reservation. The Utes, on the other hand, became the unwilling financiers of an expensive irrigation system which few Indians wanted or ultimately used. Federal assistance for irrigation projects, especially by the Bureau of Reclamation, was certainly common enough in the semi-arid West. Rarely has a major Federal irrigation project, however, been so quickly deflected from its original intent.

Endnotes

[1] *Salt Lake Tribune*, 17, 18 August 1905.

[2] Ibid.

[3] *Journal History of the Church of Jesus Christ of Latter-Day Saints* (hereafter referred to as *Journal History of the Church*), 25 August 1861. See also 13 Stat. 63, 5 May 1864, and A.L. Walker, "A study of Economic Conditions of the Uintah Irrigation Project, Utah," Irrigation Division, Office of Indian Affairs, U.S. Department of Interior, (Washington, D.C., 1938), p. 12.

[4] Alfred J. Charles, *Annual Report, 122*, Uintah Irrigation Project, in Irrigation Service, Annual Reports, District 2, 1921-22, Box 75, Bureau of Indian Affairs, Record Group 75, National Archives, Washington, D.C. Hereafter the following abbreviations will be used: BIA, Bureau of Indian Affairs; RG, Record Group; NA, National Archives.

[5] Ibid.

[6] *Journal History of the Church*, 27 August 1861.

[7] *Deseret News*, 25 September 1861.

[8] Floyd A. O'Neill and Katherine L. MacKay, "A History of the Uintah-Ouray Ute Lands," in *American West Occasional Papers*, 10 (Salt Lake City, Utah: American West Center, 1978), p. 7.

[9] U.S. Congress, House, *The Water Supply of the Uintah Indian Reservation, Utah* by Cyrus Cates Babb (hereafter referred to as the Babb Report), Doc. 671, 57th Cong., 1st Sess., 1902, p. 22.

[10] Robert Waugh to Hon. T.J. Morgan, Commissioner of Indian Affairs, 16 November 1891, in Irrigation Division, General Correspondence Files, Box 25, BIA, RG 75, NA.

[11] Wallace E. Stegner, *Mormon Country* (Lincoln, Nebraska: University of Nebraska Press, 1942), pp. 146-147.

[12] Andrew Jenson, *History of Uintah Stake, The Church of the Latter-Day Saints*, quoted in *Inventory of the County Archives of Utah*, No. 24, Uintah County (Ogden, Utah: Works Progress Administration, 1940), pp. 33-34.

[13] Babb Report, p. 22. The report also described the Military Canal built by the U.S. Army at Fort Duchesne. The canal diverted water from the east bank of the Uinta River at an elevation of 5,100 feet above sea level. The canal supplied water to approximately 300 people, including civilians, for largely culinary purposes. The water was also used for the fort's livestock and to water "a garden and lawn."

[14] Ibid., p. 8.

[15] Ibid., pp. 14, 38.

[16] John Wesley Powell, *Report on the Lands of the Arid Region* (Washington, D.C.: Government Printing Office, 1879). See also Stanley Davison, *The Leadership of the Reclamation Movement, 1875-1902 (New York City: Arno Press, 1979) and Wallace E. Stegner, Beyond the Hundredth Meridian: John Wesley Powell and the Second Opening of the West* (Boston, Massachusetts: Houghton Mifflin, 1954).

[57] W.H. Code to Secretary of the Interior, 6 June 1905, in Irrigation Division, Gen. Corres. Files, Box 25, BIA, RG 75, NA.

[58] Frederick E. Hoxie, *A Final Promise: The Campaign to Assimilate the Indians, 1880-1920* (Lincoln, Nebraska: University of Nebraska Press, 1984), pp. 154-155.

[59] Ibid., pp. 164-165.

[60] 34 Stat. 375, Public Law 258, 21 June 1906.

[61] F.E. Leupp, Commissioner of Indian Affairs, to Secretary of Interior, 29 January 1906, in Irrigation Division, Gen. Corres. Files, Box 25, RG 75, NA.

[62] "Annual Report for 1919," by H.W. Dietz, Supervising Engineer, Uintah Irrigation Project, *Irrigation Service Annual Reports*, District 2, in Irrigation Division, Gen. Corres. Files, Box 67, BIA, RG 75, NA.

[63] "Uintah Irrigation Project Annual Report for Operations and Maintenance for Fiscal Year 1935," Irrigation Division, Office of Indian Affairs, U.S Department of the Interior (Washington, D.C., 1935).

[64] H.C. Williams, "Monthly Progress Report, Uintah Irrigation Survey," 29 February 1912, U.S. Department of the Interior (Washington, D.C., 1912).

[65] Chief Engineer, Indian Irrigation Service, to Secretary of the Interior, 9 November 1908, in Irrigation Division, Gen. Corres. Files, Box 26, BIA, RG 75, NA.

[66] "Investigation of Bureau of Indian Affairs," House Committee on Interior and Insular Affairs, *U.S. Congressional Report No. 2503*, 82nd Cong., Second Sess., 1953, pp. 1007-1008.

[67] 34 Stat. 375, P.L. 258, 21 June 1906.

[68] Commissioner of Indian Affairs to Mr. Burke, 28 September 1922, BIA, LR, RG 75, NA.

[69] Babb Report, p. 3.

[70] Stat. 375, P.L. 258, 21 June 1906.

[71] Babb Report, p. 3.

[72] Babb Report, p. 13.

[73] George Bauer to Secretary of the Interior, 11 April 1892, in Irrigation Division, Gen. Corres. Files, Box 25, BIA, RG 75, NA.

[74] Act of 21 June 1906, ch. 3504, 34 Stat. 375, Public Law 258, (Uintah Reservation); Act of March 3, 1905, ch. 1452, art. III, 33 Stat. 1016, 1017, 1020 (Wind River Reservation); Act of 30 May 1908, ch 237, & 2, 35 Stat. 558, 560 (Fort Peck Reservation); Act of 1 March 1907, ch. 2285, 34 Stat. 1015, 1035 (Blackfeet Reservation). See also Richard B. Collins, "Indian Allotment Water Rights," *Land and Water Law Review*, 20, number 2, (1985), 421-457.

[75] Robert G. Dunbar, *Forging New Rights in Western Waters* (Lincoln, Nebraska: University of Nebraska Press, 1983), p. 193.

[76] *F.H. Newell, Hydrographer, to Charles Walcott, USGS, 24 March 1900, in Irrigation Division, Gen. Corres. Files, Box 25, RG 75, NA.*

[41] *Charles Walcott to Secretary of the Interior, 17 April 1911, in Irrigation Division, Gen. Corres. Files, Box 25, RG 75, NA.*

[42] *See Norris Hundley, Jr., "The Dark and Bloody Ground of Indian Water Rights: Confusion Elevated to Principle," Western Historical Quarterly,* 9 (1978), 460-465, and, Norris Hundley, Jr., "The Winters Decision and Indian Water Rights: A Mystery Reexamined," *Western Historical Quarterly,* 13 (1982), 17-42.

[43] William McCrea, Assistant U.S. Attorney, Salt Lake City, to Capt. C.G. Hall, Acting Indian Agent, Whiterocks, Utah, 17 August 1910, in Irrigation Division, Gen. Corres. Files, District 2, Box 26, BIA, RG 75, NA.

[44] The basis for this statement is an interchange of letters between Agent Hall and Commissioner Leupp. In a letter dated 29 March 1905, Hall expressed his fear that the Indians would lose their water rights in the State of Utah. Hall wrote his chief that "something should be done to prevent such a calamity either by Executive action, or, if necessary, by Congressional legislation." In his response, dated 11 April, Leupp urged Hall go to "to the last limits of the law" to protect Indian water rights, but it was clear that the law would be that of the State of Utah. "Their future," wrote the commissioner, "depends very largely on the manner in which you perform your duties. After allotment they will be citizens of Utah." This letter exchange may be found in Irrigation Division, Gen. Corres. Files, Box 24, BIA, RG 75, NA.

[45] W.H. Code, Chief Engineer, to Secretary of the Interior, 4 May 1905, in Irrigation Division, Gen. Corres. Files, Box 25, BIA, RG 75, NA.

[46] F.E. Leupp, Commissioner of Indian Affairs, to Secretary of the Interior, 29 January 1906, in Irrigation Division, Gen. Corres. Files, Box 25, BIA, RG 75, NA.

[47] Capt. C.G. Hall, Indian Agent, to Commissioner of Indian Affairs, 5 October 1906, in Irrigation Division, Gen. Corres. Files, Box 25, BIA, RG 75, NA.

[48] Ibid.

[49] Chief Engineer, Indian Service, to Secretary of the Interior, 9 November 1908, Irrigation Div., Gen. Corres. Files, Dist. 2, Uintah, Box 26, BIA, RG 75, NA.

[50] Superintendent, Indian Irrigation Service, to W.H. Code, Chief Engineer, 18 February 1911, in Irrigation Division, Gen. Corres. Files, Box 26, BIA, RG 75, NA.

[51] Caleb Tanner, Utah State Engineer, to Acting Chief Engineer, Indian Service, 11 March 1912, in Irrigation Division, Gen. Corres. Files, Box 26, BIA, RG 75, NA.

[52] Albert H. Kneale and C.R. Olberg, "Report on Crop Damage," Uintah Irrigation Project, Utah, 1922, p. 33., in Irrigation Division, Gen. Corres. Files, Box 25, BIA, RG 75, NA.

[53] H.W. Dietz, Superintendent of Irrigation, to W.M. Reed, Chief of Irrigation, 31 October 1913, in Irrigation Division, Gen. Corres. Files, Dist. 2, Box 26, BIA, RG 75, NA.

[54] Joseph Bryant, Engineer, to W.M. Reed, Chief Engineer, 7 March 1916, and F.R. Schank, Assistant Inspector of Irrigation, to Commissioner of Indian Affairs, 2 February 1916, both in Irrigation Division, Gen. Corres. Files, Box 27, BIA, RG 75, NA.

[51] Albert H. Kneale, *Indian Agent* (Caldwell, Idaho: The Caxton Printers, Ltd., 1950), p. 279.

[52] Ibid., p. 270.

[53] Ibid., p. 271.

[54] Ibid., p. 285.

[55] Flyer in 1916 Letter Book, Irrigation Division, Gen. Corres. Files, Box 27, BIA, RG 75, NA.

[56] "Opportunities Awaiting You in the Uintah Basin," Flyer in Irrigation Division, Gen. Corres. Files, District 2, Uintah, 1916, RG 75, NA.

[57] A.L. Walker, "A Study of Economic Conditions on the Uintah Irrigation Project, Utah, . . . ," U.S. Department of the Interior, Office of Indian Affairs, Irrigation Division, 1941, p. 69.

[58] Porter J. Preston and Charles A. Engle, "Report of Advisors on Irrigation on Indian Reservations," 8 June 1928, in *Survey of Conditions of the Indians in the United States: Hearing before a Subcommittee of the Committee on Indian Affairs, United States*, 72nd Cong., Second Sess., 21 January 1930, p. 2589.

[59] Flyer in 1916 Letter Book, Irrigation Division, Gen. Corres. Files, Box 27, BIA, RG 75, NA.

[60] Kneale and Olberg, "Report on Crop Damage," p. 106.

[61] Kneale, *Indian Agent*, p. 297.

[62] Kneale and Olber, "Report on Crop Damage," p. 149.

[63] H.W. Dietz to W.M. Reed, May 17, 1919, in Irrigation Division, Gen. Corres. Files, Box 27, BIA, RG 75, NA.

[64] A.L. Walker, "A Study of Economic Conditions on the Uintah Irrigation Project, Utah . . . ," U.S. Department of the Interior, Office of Indian Affairs, 1941, p. 52.

[65] Hoxie, *A Final Promise*, pp. 158-159.

[66] Kneale, *Indian Agent*, p. 323. Kneale later accepted another position with the BIA in the Northern Navajo Reservation, New Mexico, in June of 1923.

[67] F.H. Abbot, "Comments on Irrigation Law and Administration on Indian Reservations," BIC, Reference Material, Tray 117, Irrigation Central Classified Files, BIA, RG 75, NA, p. 1-2, as quoted in Janet Ann McDonnel, "The Disintegration of the Indian Estate: Indian Land Policy, 1913-1929," (Ph.D. dissertation, Marquette University, 1980), pp. 70-71.

[68] "Report of the Commissioner of Indian Affairs to the Secretary of the Interior for Fiscal Year Ended June 30, 1916," U.S. Department of the Interior, (Washington, D.C.: Government Printing Office), pp. 41-42. See also, Coulsen and Geneva Wright, "Indian-White Relationship in the Uintah Basin," *Utah Humanities Review*, II, NO. 4, (October 1948), pp. 335-336.

[69] F.H. Abbot, "Comments on Irrigation Law and Administration on Indian Reservations," BIC, Reference Material, Tray 117, Irrigation Central Classified Files, BIA, RG 75, NA, pp. 1-2, as quoted in Janet Ann McDonnel, "The Disintegration of the Indian Estate: Indian Land Policy, 1913-1929," (Ph.D. dissertation, Marquette University, 1980), pp. 70-71.

CHAPTER TWO

IRRIGATION BY DEFAULT: SETTLEMENT OF THE ASHLEY VALLEY AND THE UINTA BASIN

by Craig W. Fuller, Gregory D. Kendrick, and Robert W. Righter

Much of the local pressure to open the Uintah Indian Reservation to homesteading came from the existing white settlement immediately east of the reservation in Ashley Valley. Named after William Henry Ashley, an early fur entrepreneur headquartered in St. Louis, Ashley Valley was geographically separated from the rest of the Uinta Basin by Asphalt Ridge stretching along its western flank. Ashley Creek and Brush Creek meandered through the heart of this small but fertile valley.

Geographically isolated, the valley was slow to be settled. Suggestive of changing times, no organized groups of Latter-day Saints were called by church leaders to colonize Ashley Valley. Instead, individual farmers and ranchers from Heber, Utah, and other communities drifted into the valley as information relating to its agricultural potential spread throughout the territory.

Individual families began arriving in the 1870s. Pardon Dodds, former Uintah Indian Agent, is credited by most as the valley's first permanent settler. Others soon followed. Charles Popper, a Jewish merchant from Salt Lake City, established a cattle ranch which soon provided meat for his slaughterhouse near Fort Douglas, Utah. Dan Moseby, Andrew Strong, Robert H. Snyder, John Kelley, and Teancum Taylor had all located in the valley by 1877. Forsaking the ideal Mormon "Plat of the City of Zion" which clustered small farms around New England-style villages, these first homesteaders established ranches and farms that were geographically scattered throughout the valley.[1]

Pardon Dodds was the first to divert water from Ashley Creek to irrigate pasture lands for his livestock.[2] Others soon made additional diversions. These first canals were often crudely constructed without the aid of surveying equipment. In order to operate efficiently, a canal had to lose elevaton at a regular rate so that the water would move through it without depositing silt or sediment. Conversely, water must not drop too sharply or erosion of the canal's lining, and ultimately breaching of the canal, could occur. Lacking proper surveying equipment, farmers often used simple devices such as pans of water to help them determine the proper alignment and fall of the canal. Often the only way to ascertain the adequacy of a "level" was to allow the water to flow through a portion of the canal and then observe the speed of its flow.[3]

Construction of canals was usually undertaken by Mormon farmers who would later benefit from the irrigation of their fields. Simple plowing devices called "go devils," consisting of heavy planks bolted together in the shape of an "A," assisted their efforts by breaking the sod prior to excavation of the canal right-of-way. Premiums were placed on time rather than large capital investments. As a consequence, jerry-built headgates proliferated, and canals were prone to periodic washouts and constant seepage.[4]

Although Pardon Dodds was the first to divert water from Ashley Creek, a more elaborate venture soon followed. In 1879 a number of farmers united to build the Ashley Central Canal. Like many similar small canals of the time period, wooden headgates or earthen diversion dams diverted water near the mountain canyon mouth in order to reduce the overall length of the canal. By diverting water at so low an elevation, however, the amount of land capable of receiving water was correspondingly reduced. The Ashley Central Canal, typical of many contemporary Mormon canals, was relatively

Horse drawn go-devils and scrapers were used to excavate canals. (Photograph courtesy of Fort Duchesne, 1922.)

short, initially reaching 3.5 miles in length with a carrying capacity to irrigate 9,000 acres around Vernal, Utah.[5]

By 1884, when the farmers incorporated as the Ashley Central Irrigation Company, the canal had nearly doubled in size and had appropriated one-third of the water of Ashley Creek to accommodate the valley's agricultural expansion. Like most early Mormon irrigation systems, branch canals extended from the main canal. Off these branch canals, "laterals" actually watered the fields. When the wooden gates to the laterals were opened, water was distributed to the desired fields.[6]

The first officers of the Ashley Central Irrigaiton Company included Jeremiah Hatch, Israel J. Clark, Alvah Hatch, J. Hackling, W.H. Gagin, George Bankhead, C.C. Bartlett, James B. Henry, and Porter Merrill. At the time of incorporaton, 57 shareholders owned shares valued at approximately $12.50 per share.[7] Control over the distribution of water was placed in the hands of local watermasters. County courts empowered these individuals to distribute the fair share of water to farmers with appropriated water rights. Watermasters regulated the opening and closing of canal headgates so no farmer could take more water than his fair share. Clearly, the watermaster retained enormous power within a community, and men were largely selected for this position by the local Mormon hierarchy.[8]

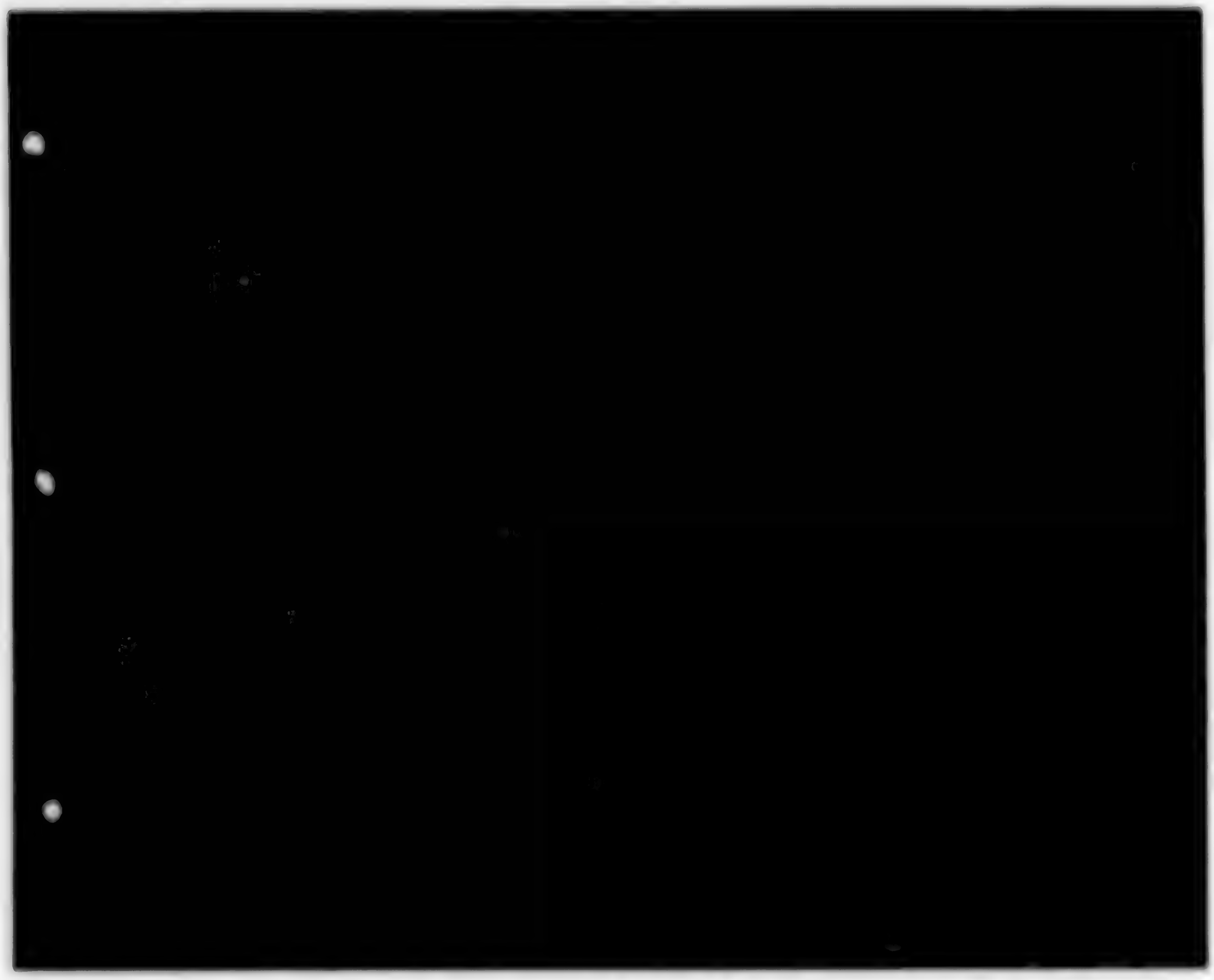
Construction of a second major canal, the Ashley Upper, followed late in 1879. Following the pattern established by the Ashley Central, farmers incorporated in 1884 as the Ashley Upper Irrigation Company. By that time the canal stretched for 12 miles. The first trustees of the irrigation company included: James H. Glines, president; P. Stringham, secretary; George D. Merkley, treasurer; and Lycurgus

Johnson, S.D. Colton, D. Bingham, R. Bodily, C.H. Glines, and William O'Neil as trustees. The company initially claimed one third of the waters of Ashley Creek. This claim was subsequently reduced in 1897 by court decree to less than one-third of the flow of Ashley Creek.[9]

These first canals served the farmers of Ashley Valley well. Yet the technology used in their design and construction remained essentially unchanged from the first ditches dug 2 decades earlier by Mormons in the Salt Lake Valley. Ironically, the same Mormons who had pioneered irrigation in the West had fallen behind the rest of the country in irrigation technology and agronomy by 1880. Whereas farmers throughout the West initially traveled to Utah for guidance in providing water to their crops, delegates from other States attending the first National Irrigation Congress held in Salt Lake City in 1891 believed Mormon irrigation techniques had become archaic and inefficient.[10] One of the speakers reported that "the average Utah farmer firstly uses too much water, secondly he does not vary properly the quantity of water to suit the different character of his crops, and thirdly, he rarely keeps up the degree of surface tilth that, while admitting the atmosphere, best retains the moisture by lessening the evaporation."[11]

Construction drawings such as this one for a lateral gate on the Lake Fork Canal were [illegible] by the Indian Irrigation Service. (Photograph courtesy of Forth Duchesne, 1910.)

Mormons in Ashley Valley were guilty on all three charges. Farmers persisted in using the traditional method of continuous flow to irrigate their crops. This technique provided a continuous small rivulet of water but generally was inadequate to properly irrigate row crops or fields of oats or alfalfa. Agricultural scientists, such as John A. Widtsoe and W.W. McLaughlin, traveled widely throughout the State encouraging farmers to improve their water management. Ashley Valley irrigators, however, refused



Indian Irrigation Service construction drawing of measuring unit for the Lake Fork Canal. (Photograph courtesy of Fort Duchesne, 1910.)

to adopt the new irrigation technique until after World War I. Only when local farmers testified that the rotation method was better did Ashley farmers begin to listen. Speaking positively about the new irrigation system, David Cooper, a local irrigator, stated, "I would say to you and to all other water users that the rotation system is the only way to use water as it gives one enough water at one time so that he can get over the ground and do it better and so much quicker. The old way [continuous flow] I was forever watering and never got the ground wet, but now I can do all the irrigating I had to do in my allotted time and do it right."[12]

Cooper concluded his testimony by pointing out to his fellow irrigators that the new system provided one additional benefit: "It has put a stop to all quarreling over water on the lateral."[13] The growing frequency of these quarrels no doubt reflected a corresponding increase in the number of farmers within Ashley Valley. By the 1880s, Ashley Valley settlers had been joined by a host of other homesteaders, all of whom cast covetous eyes toward the undeveloped land and unused water within the Uintah Indian Reservation.

PRELUDE TO THE RUSH FOR RESERVATON LAND

Even as Congress debated the merits of the Dawes Act, Utahns were quietly entering the Uintah Indian Reservation to evaluate and appropriate its natural resources. Settlers in Heber Valley, having experienced a number of dry years, turned eastward for new, dependable sources of water. Farmers located along Daniels Creek at the south end of Heber Valley visualized bringing water over the Wasatch

Mountains from the upper reaches of the Strawberry Valley to their farms. In the spring of 1882 Hyrum Oaks, his son John, William S. Bethers, and 50 other Heber farmers had successfully diverted water from the upper tributaries of the Strawberry River—Indian water—to Daniels Canyon and down to the Provo Valley. Unable to divert enough water at a sufficient elevation to permit gravity flow over the crest of the divide, a second group of Heber Valley farmers eventually excavated a 1,000-foot tunnel through the mountain.[14] These early privately-financed diversion efforts would evenutally lead to the first Bureau of Reclamation project in Utah. Twenty years later, the Bureau of Reclamation's Strawberry Project diverted Colorado Plateau water through the Wasatch Mountains to Utah Valley farmers in the Great Basin.[15]

Water was not the only natural resource that interested Utah inhabitants. During the last decades of the 19th century, a curious black substance, thought first to be coal, but later identified as gilsonite, was discovered in large quantities on the Uintah Reservation and in southern Uintah County. An important substance in shipbuilding, in the storage and shipping of beer, and in the growing electrical industry, gilsonite was eagerly sought by mining companies throughout the United States. In 1886, Bert Seaboldt filed on the first gilsonite mining claim in the Uinta Basin. Other discoveries occurred shortly thereafter, mostly located on the Uncompahgre and Uintah Indian reservations. Within 2 years Congress, acting under intense pressure, threw open 7,000 acres of the Uintah Indian Reservation to the mining of gilsonite. The town of Moffat soon appeared on the 7,000-acre "Strip," replete with a frontier allotment of saloons, gambling halls, and houses of ill-fame. The town's lawless reputation in combination with pleas from Indian agents for order prompted the Secretary of the Interior, E.A. Hitchcock, to warn management of the Raven Mining Company "to keep its miners in check or the company's gilsonite lease would be revoked and the miners ejected from the reservation."[16] Although shortlived—the town was nearly deserted in 1901—the "Strip" established the precedent for future allocations of Indian lands.

Ranchers from Provo and Utah Valleys found the Strawberry Valley, Tabiona Valley, and the northern flank of the Uinta Basin to be ideal summer grazing lands for their stock. The region south of the Duchesne River and west of the Green River proved to be good spring grazing and lambing grounds. In 1901, Indian agents reported that two ranchers from Heber and Utah Valleys were grazing 90,000 head of sheep and several hundred head of cattle on their respective Indian grazing leases. These ranchers added their pleas to the chorus of voices demanding that the reservation be opened to settlement.[17]

Local newspapers and the Salt Lake City Chamber of Commerce echoed these colonization sentiments. The *Vernal Express* extolled the virtues of the Basin, suggesting that "the Basin could support some 20,000 people," and with the development of irrigation "some 50,000 people could be maintained in the Uinta Basin."[18] In December of 1893, the Salt Lake City Chamber of Commerce petitioned Joseph L. Rawlins, a Utah delegate to Congress, to support the opening of the Uintah and Uncompahgre Reservations to settlement. The petition praised the fertility of the reservation lands and asserted that the influx of settlers would add to the territory's prosperity.[19]

In August 1898 the *Vernal Express* added its support to opening the reservation. The newspaper viewed the current acreage which comprised the reservation as "now being idle and a desert waste merely to gratify the whim of a handful of lazy Indians." Once each Indian family had received their land allocation, the local press continued, " . . . there would be thousands of acres left for white settlers to occupy which make this portion of Utah one of the most productive sections in the Rocky Mountains."[20]

The effort of the Chamber of Commerce to encourage gentile homeseekers to come to the land of Zion no doubt deeply concerned many leading Mormon Church officials and undoubtedly sparked a reassessment of Brigham Young's 1861 decision not to colonize the Uinta Basin. Indeed, much had changed over the ensuing 40 years. Church leaders now felt a pressing need to identify and evaluate additional agricultural outlets for their expanding population. By 1900 most habitable lands throughout the Great Basin and Rocky Mountains had been colonized. A high Mormon birth rate, a prolonged agricultural and mining depression, and an ever-encroaching gentile population fueled the colonization fire. The proposed opening of the Uintah Indian Reservation seemed to be an answer to these growing church concerns.

Church officials reacted swiftly to congressional plans which proposed opening the Uintah Reservation to settlement. For some time prior to the 1905 opening of the Uintah Reservation, local Mormon Church officials in Heber Valley had been quietly developing plans whereby church members could secure the choicest lands with the best available water rights. William H. Smart, President of the Wasatch Stake headquartered in Heber City, spearheaded the organizational activities.

Born in Franklin, Idaho, in 1862, Smart later attended Brigham Young College in Logan, Utah. Following graduation, he secured a teaching position at his alma mater and taught for a short time before serving on Mormon missions in England and Turkey. Upon his return, Smart founded what became a very large and successful livestock company known as the Smart and Webster Livestock Company of Rexburg, Idaho. His economic prosperity and religious devotion were rewarded by the church leaders when in February of 1901 he was appointed Wasatch Stake President. Importantly, his ecclesiastical jurisdiction extended over the Uintah Indian Reservation.[illegible]

Knowing the Uintah Indian Reservation might soon be opened to settlement, Smart requested approval from the church's central authorities in Salt Lake City to organize and to direct settlement of church members on the reservation. Approval came quickly. In 1899, Apostle Abraham O. Woodruff, a member of the Council of Twelve, was appointed to oversee all Mormon colonization ventures, including colonization of the Uinta Basin.[illegible]

With the approval granted, Smart felt a personal mission to help bring about the establishment of Zion in the semi-arid basin. Smart acknowledged that water would be the key to settlement. Writing in his journal, he confessed, "I still feel the necessity of our people making an invited struggle to become in possession of the majority of this land and water and I feel still desirous of being a humble instrument in Father's hands of assisting to bring this about."[illegible]

The burden of Smart's colonization responsibility was greatly eased by the existing legal, economic and administrative framework laid by the Mormon Church during the previous 5 decades. By the turn of the 20th century, the Mormons had developed efficient institutions for the control and apportionment of water. Upon first reaching the Great Salt Lake Valley, Brigham Young enunciated the basis for all future Utah irrigation law by propounding a doctrine of community good over the interests of the individual. The doctrine abandoned the English common law system of "riparian rights" which required owners who used water to return an undiminished amount of water to the stream before the river reached his neighbor's land. Instead, the Latter-day Saints developed a variation of the Spanish "Doctrine of Appropriation" which allowed diversion of water from a stream, though this might prove detrimental to other landowners located up or downstream.[illegible] The territorial legislature first codified the doctrine in 1852: "The county court shall have control of all timber, water privileges, or any water course or creek, to grant mill sites, and exercise such powers as in their judgement shall best preserve the timber and subserve the interest of the settlement in the distribution of water for irrigation or other purposes."[illegible]

County courts, composed of a probate judge and three selectmen, granted water for irrigation purposes, adjudicated protests, and approved applications for canal or dam construction. Ultimate distribution of the irrigation water fell to Mormon bishops and their specially appointed watermasters. The bishops' courts, consisting of the bishop and his two counselors, resolved water use controversies. The act of 1852 was followed 13 years later by another piece of territorial legislation establishing irrigation districts. This act allowed local irrigators greater autonomy and flexibility in developing and managing water.[illegible]

In 1880 two additional important developments in water law occurred. Water was no longer controlled by the county courts, but became "personal property." Land and water could now be bought and sold separately. The 1880 legislative change represented virtual abandonment of Utah's distinctive water control institutions and reflected what historian Gustive O. Larson has termed the "Americanization" of Utah.[17] The reasons for the radical change are complex and open to interpretation. However, one can safely state that the existing Mormon system of water administration had become cumbersome and strained by 1880. In addition, the crusade to abolish polygamy and general wave of "anti-Mormon" legislation of the 1860s and 1870s portended future Federal intervention in Mormon society. Faced with an inadequate system and confronted with the imminent probability of Federal interference, the all-Mormon legislature of 1880 rescinded the statute of 1852. The pragmatic legislative change facilitated the perpetuation of Mormon control and brought the territory more in line with the laissez-faire, individualistic water rights institutions of other Western States and territories.

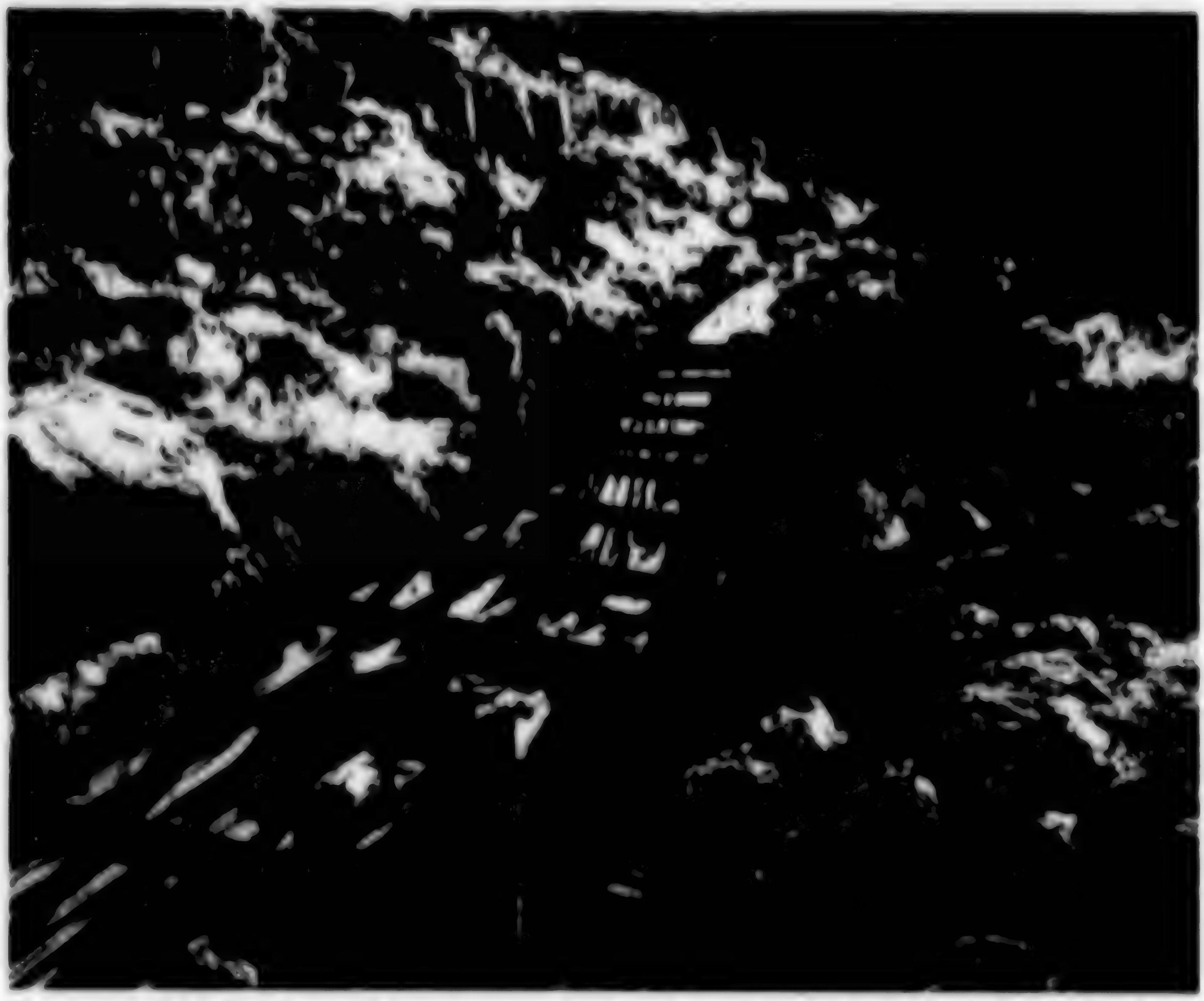
The 1880 law also permitted irrigation districts to incorporate into mutual irrigation companies having all the benefits and protection of other incorporations as permitted by earlier law. The 1880 legislation reflected the growing Mormon tendency to encourage ecclesiastical corporations to hold church property and to manage mercantile and industrial cooperatives. Mormon colonization efforts begun after 1880 would follow this corporate framework, with shares of stock subscribed, dividends distributed, and property rights (including water) precisely described and apportioned. The corporate framework facilitated the controlled expansion of Mormon colonization into the 20th century and into remote areas increasingly surrounded by gentile populations.[18]

Following this organizational framework, the Wasatch Development Company was formed, in part to promote and guide settlement of the Uinta Basin. Like many contemporaneous colonization efforts such as the Big Horn Basin Colonization Company (1900), formed to oversee colonization of Latter-day Saints in northern Wyoming, the Wasatch Development Company was financially assisted by the church. The church no doubt retained a block of stock in the company to ensure that the company's human and natural resources would be bent toward the greater benefit of Zion and not directed toward speculative commercial enterprises.[19]

William H. Smart was appointed president of the Wasatch Development Company while John E. Austin became vice-president, and Joseph W. Musser was secretary-treasurer. Steward and Sons of Provo were hired as the company's surveyors, A. C. Hatch of Heber was the general counsel, William Buys was appointed the company's engineer, Booth and Cluff were the land attorneys, and J. C. Jensen was the company's auditor. The company's general offices were located in the Heber Bank building. A branch office was established in Vernal under the direction of R. S. Collett. Smart reminded the officers at the time of the company's incorporation that it was their duty to "act in accordance with the Lord's work and to govern themselves accordingly." More specifically, it was their purpose to help the Latter-day Saints locate on the best lands and to aid them in proving up their homesteads.[20]

Beginning in September of 1903, Smart led a series of clandestine reconnaissance surveys of the Uintah Indian Reservation to identify the best lands for later settlement. During these exploratory trips, he began to conceptualize the complex nexus of canals which would eventually unite Indian and Mormon farmers in the Uinta Basin. Writing later of his trips, he recommended the construction of a "very large canal system which could irrigate hundreds of acres of land owned by anticipated Mormon settlers." Specifically he advocated construction of the Strawberry and Duchesne canal system to irrigate south of and along either side of the Duchesne River. The Blue Bench canal system would provide water to Blue Bench and adjacent territory. The Lake Fork System would cover land on either side of this river. The upper Rock Creek System would irrigate Dry Gulch Irrigation Company country and adjacent lands. Finally, the dual Uinta River system would convey water to land on both sides of the Uinta River.[21]

On November 13, having returned from one of his trips to the Basin, Smart met with the Latter-day Saints Church's First Presidency to discuss management of Mormon settlement. During that meeting,



The serpentine Knight Ditch flume guided water over rugged sage brush covered terrain to irrigate farmlands on the Blue Bench.

Smart asked President Joseph F. Smith "whether it is desired that the Wasatch Stake authorities father the colonization of that portion of the reservation lying within Wasatch County . . . ?" President Smith emphatically responded that "it be colonized under the direction of the Presidency and the High Council of the Wasatch Stake."[12]

A few months later, Smart again traveled to Salt Lake City to meet with Smith. At this meeting Smith expressed his concern that a growing number of young people of the church were moving to the city and, as a consequence, many were leaving the church. Smith believed their participation in colonization ventures like the one planned for the Uinta Basin would help to ameliorate the problem. Before ending the meeting, Smith urged Smart to work closely with Apostle George Albert Smith who had earlier been appointed general land officer for the State.[13]

Shortly after his meeting with Smith, Smart journeyed to Provo to discuss the proposed opening of the reservation with Utah's Apostle Senator, Reed Smoot. The meeting proved rewarding, as Smart obtained Smoot's promise to support the colonization effort in the Senate and keep him apprised of any developments in Congress which might have a bearing on the colonization scheme.[14]

And developments in Congress were positive, at least from the Mormon settlers' point of view. Reservations in the West were being allotted and opened to white settlement, with or without the permission of the Indians. Furthermore, under the Rosebud Act (1904) the Government would not be required to purchase the surplus land. In other words, surplus land would be transferred directly to settlers, rather than the Government acting as intermediary. Of course, the proceeds of any land sale were to go to the reservation account, but now Congress would not be required to appropriate up-front money to purchase Indian lands in order for the allotment process to move forward. Under this legislation, portions of four large reservations, including the Uintah, were opened in 1905 to white settlement.[35]

In the months that followed, Smart met frequently with President Joseph F. Smith in Salt Lake City about appropriate colonization procedures. At one of these meetings, Smith urged Smart to work closely with stake presidents in Utah, especially President Rueben G. Miller of the Emery Stake. Miller was particularly anxious to provide an outlet for some of his hard-pressed people to settle on new irrigable lands. The decision to work through local church authorities would cause Smart and the church considerable embarrassment later.[36]

Smart also met with Edward H. Anderson, Surveyor-General for the U.S. Land Office in Utah, during his frequent visits to Salt Lake City. Anderson outlined the Federal legislation and prodecures to be followed if people wanted to homestead on Government lands.[37] The Homestead Act of 1862, for example, required settlers to construct homes and to reside on 160-acre homesteads. The requirement to homestead large tracts of land, scattered throughout the basin, challenged traditional Mormon colonization strategies. Before 1869, when Congress passed laws under which the land in Utah could be privately acquired, Mormon leaders strongly recommended small, intensively cultivated holdings, often no more than 20 acres, with farmers residing in adjacent small communities. Church leaders believed that by following this so-called "Plat of the City of Zion" plan, religious principles were strengthened and a strong sense of cooperation and group cohesion was maintained.[38]

As late as 1882, the church supported group settlement and the farm-village concept. A letter from John Taylor, President of the Mormon Church, to Stake President William B. Preston of Logan, reflected the church's commitment to this settlement strategy and clearly articulated the continuing rationale for the tradition long after the frontier period had passed. Taylor advised colonists to "gather in villages, as has been our custom from the time of our earliest settlement in these mountains." By so doing, he continued, "the people can retain their ecclesiastical organization, have regular meetings of the quorums of the priesthood, and establish and maintain day and Sunday schools, Improvement Associations, and Relief Societies. They can also cooperate for the good of all in financial and secular matters, in making ditches, fencing fields, building bridges, and other necessary improvements."[39]

These Federal lands laws, therefore, forced some modifications in established Mormon colonization practices. But church-backed cooperatives such as the Wasatch Development Company and later the Dry Gulch Irrigation Company continued to foster many of the positive Mormon attributes such as group consciousness, cooperative spirit, and shared labor, which the "Plat of the City of Zion" earlier had provided.

Following his meeting with Anderson, Smart, in May of 1905, held a meeting in Heber City with his two councilors and the Latter-day Saint Wasatch High Stake Council. He suggested that they write letters to all stake presidents in Utah informing them of their colonization efforts and providing guidance to prospective homesteaders. In response to this meeting, the Wasatch Stake Presidency, composed of William Smart, Joseph Murdock, and James Jensen, published a letter in the *Salt Lake Tribune* on June 7, 1905. The letter informed all interested Mormon readers of the upcoming land lottery and provided reassurances that the Church "through land office connections" had identified the best farm lands in the Uinta Basin. The letter discouraged Mormon families "with good homes" from relocating to the remote valley. Instead, the letter encouraged "young men and middle aged, who have little or no holdings where they now reside, who are ambitious to create homes and are prone to grow up with the country," to participate in the land rush.[40]

Following his last scouting trip to the Uinta Basin, Smart met with his councilors in the Wasatch Stake Presidency to reorganize the existing Wasatch Development Company which was to serve as the corporation for promotion and development of church homesteading in the basin. The reorganization occurred following church services held in Heber City on June 4, 1905. Smart had apparently decided to sever his direct involvement in the company. With Smart out of the picture, his First Councilor, Joseph R. Murdock assumed the executive postition. Assisting Murdock, Joseph W. Musser was selected as vice chairman of the executive board of the Wasatch Development Company.[41]

Murdock had been born in Salt Lake City on August 11, 1858, and later attended Brigham Young Academy in Provo. After graduation, he secured a teaching position in Charleston, located in Heber Valley. His attention, however, turned from teaching to farming, ranching, and commercial interests. Following his appointment to the presidency of the Wasatch Stake in 1901, Murdock became active in politics, and was elected to two terms in the State legislature from Wasatch and Uintah counties. Later, he served a term as a State senator from the Fifth Senatorial District.[42]

A barrage of problems soon beset the new head of the Wasatch Development Company. On July 2, 1905, the *Salt Lake Tribune* published a copy of Smart's letter written earlier to the stake presidents in Utah. An editorial accompanied the letter condemning the actions of Smart and the church hierarchy for their apparent illegal and underhanded methods to "gain an absolute control of the Uinta Basin and Indian reservation." The editorial further stated that either the stake presidency had connections with the land office by which they hoped to procure choice tracts of land or "the presidency is playing a bunko game upon the saints." The editorial concluded by stating that "it would be mighty interesting to know how it is that this presidency is able to get on to the reservation and select lands when everybody else is kept off. This letter, completely established the fact that there is a conspiracy among the Mormon hierarchy to steal the lands of the reservation when the opening comes."[43]

During the ensuing months lengthy articles, editorials, and cartoons filled the pages of the *Salt Lake Tribune* describing church activities in the Uinta Basin. Within weeks the furor over the "church's connection" with the U.S. Land Office reached Washington, D.C.. An investigation quickly emerged which, after a brief review of the salient facts, cleared the U.S. Land Office and its commissioner, W.A. Richards, from any impropriety. To ensure equal opportunity for all homesteaders and to prevent the possibility of corruption, Richards ordered two temporary land offices be opened in Price, Utah, and Grand Junction, Colorado.[44]

Not distracted by publicity or legal propriety, Murdock visited the reservation on Saturday, August 5, 1905, to determine firsthand where church members could obtain the best land and water rights in the basin.[45] Following this trip, Murdock met with other executive members of the Wasatch Development Company and organized the Dry Gulch Irrigation Company. The new company encouraged the formation of smaller subsidiary construction companies to construct specific canals. As an umbrella corporation, the Dry Gulch Irrigation Company provided overall development and management strategies, secured financial support, applied for water rights, and undertook legal negotiations when necessary. The presidents of these subsidiary companies automatically became members of the Dry Gulch Irrigation Company's board of directors. The company formally incorporated under existing State law on December 1, 1905, with 80,000 shares of stock valued at $200,000.[46]

According to Article 3 of the Articles of Incorporation, the overall purpose of the Dry Gulch Company was to "acquire the ownership of, and title to, by purchase, appropriation or otherwise the right to the use of the waters of the Uintah River, ... Lake Fork Creek and Duchesne stream, springs and reservoirs and waters (and to convey) to and upon the lands of those who now or hereafter become stockholders of this corporation, lying west of the Uintah River, east of the Lake Fork Creek and North of the Duchesne . . . ."[47]

The newly formed Dry Gulch Irrigation Company soon achieved these goals. By December 1905, the company had applied for 850 second-feet of water from Lake Fork, 860 second-feet from the Duchesne River, and 600 second-feet of water from the Uinta River. An additional application for 50,000 acre-feet of flood waters of the Lake Fork River followed shortly thereafter.[48]

Unusually high water in June of 1930 threatened the headgates of the Lake Fork Canal. Here employees of the Dry Gulch Irrigation Company with teams of horses are attempting to remove debris from the inlet channel. (Photograph courtesy of Fort Duchesne, 1930.)

The first officers elected to the Dry Gulch Irrigation Company ensured Mormon control of the company's resources and dictated its future financial course. R.S. Collett, First Councilor in the Uinta Stake Presidency in Vernal, was elected president. The other members included, N. Garnett Homes, vice president, N.J. Meagher, treasurer, George D. Merkley, John M. Roseberry, G. William Felt and Hyrum Baird, directors. All were actively involved in the Mormon church and local civic affairs.[49]

While Dry Gulch Irrigation Company executives scrambled to appropriate water rights and to plan an extensive irrigation system, thousands of land-hungry people descended upon the Uinta Basin.

THE UINTAH INDIAN RESERVATION LAND RUSH

For days prior to the beginning of the registration, special trains of the Denver and Rio Grande Railroad carried extra passengers to Provo, Utah. One such train, the "Uinta Special," brought nearly 1,400 Sanpete and Sevier Valley residents to Provo. By July 31, 1905, 15,000 people had arrived in Provo alone, placing considerable strain on the town's small police force, hotels, saloons, and other public facilities. In Grand Junction, eight private detectives and several additional police were hired by the town marshall to maintain law and order.[50]

By August 1, 1905, everything was ready for the opening. Beginning at 9:00 a.m. sharp and continuing through 6:00 p.m. on August 16th, hundreds of U.S. citizens registered at one of the four land offices for the right to enter the reservation, to locate the best available lands, and to place their names in the upcoming lottery. In Provo, Isabel Miller of Elsinore, Sevier County, a widow with two sons, was the first registrant. In Grand Junction, William Wayback from Ouray, Colorado, claimed the honor.[51] By the end of the first day, 2,850 people had registered in Provo, 188 in Price, 496 in Vernal, and 1,933 in Grand Junction.[52] On Saturday, August 3, 1909, several coal companies in the Price area released any miner from work who wished to register for reservation lands.[53]

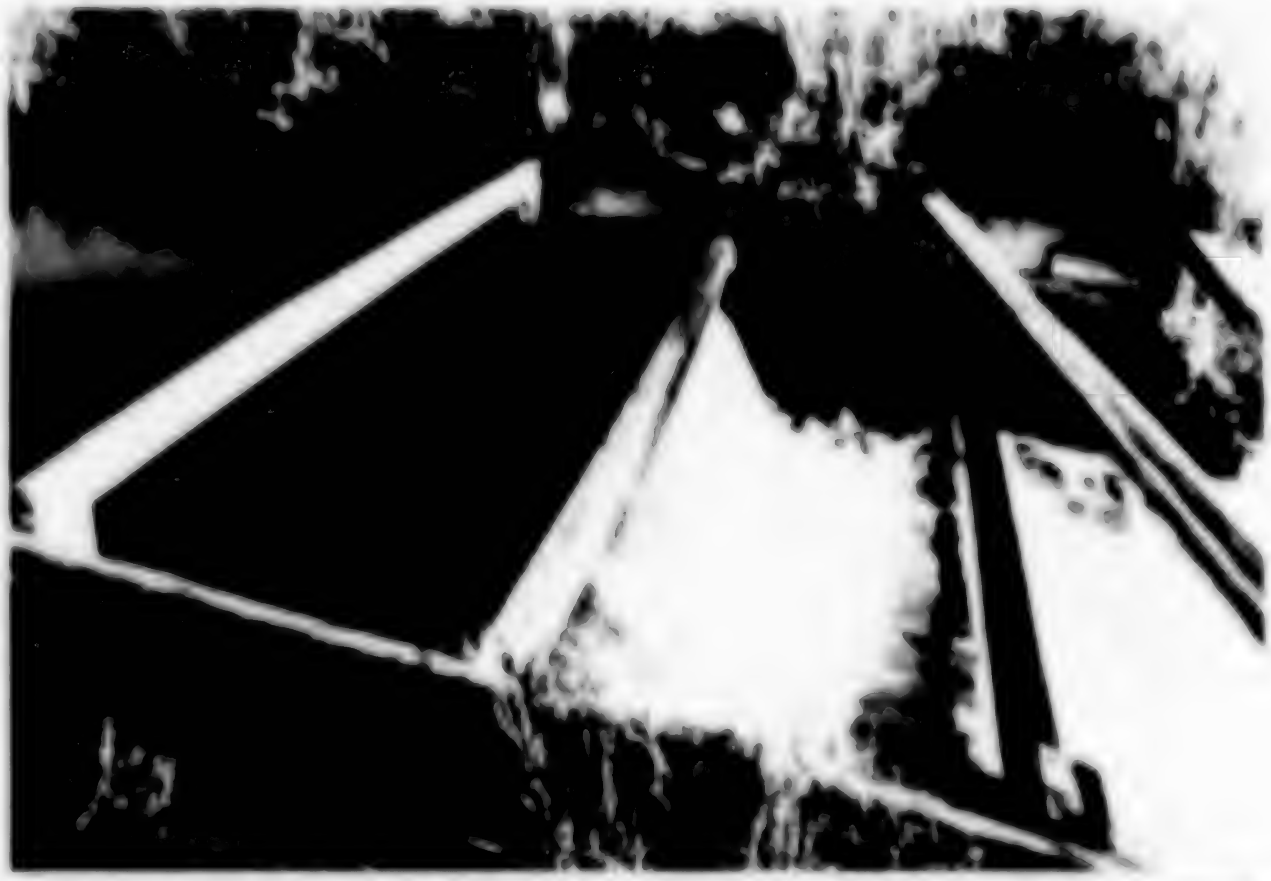
By the close of business on August 11, 16,271 people had registered in Provo. By the end of registration, the number had grown to approximately 25,000. For the next 2 weeks, roads leading to the reservation were choked with wagons, horses, and buggies. By August 16, most homeseekers had found their "ideal" homestead and were back in Provo, awaiting the luck of the lottery.[54]

People began congregating early on the morning of August 17 at the Proctor Academy for the drawing. The day before, several teenaged boys, including Arnold Rawlings, had been selected to draw envelopes containing the names of the registrants from the large wooden drums. Throughout the day, and for the next several days, the boys took turns drawing from the drum. As each envelope was opened, the name was read and recorded in numerical order. The names and numbers were then sent to the various newspapers for public notification. Those with the highest numbers received the earliest selection of lands.

Knowing that land without water was worthless, many settlers quickly purchased shares of the Dry Gulch Irrigation Company. The company offered its prospective stockholders an efficiently managed and well-financed irrigation company. Adequate capital reserves translated into professional surveyors and engineers designing the irrigation network and the ability to purchase pre-fabricated structures such as headgates, flumes, and weirs. The initial success of the company was reflected in a dramatic $600,000 increase in its capital stock by 1909. By that year, 80,000 acres of farm land lying west of the Uinta River, east of the Lake Fork River, and north of the Duchesne River were owned by stockholders. These project lands were swiftly classified according to geographic location and water supply. Following Smart's earlier conception of an irrigation system, the Dry Gulch began planning a canal network capable of irrigating an estimated 600 square miles of former Indian reservation lands situated in the heart of the Uinta Basin.[55]

Between 1905 and 1915, the company made a concerted effort to construct and acquire an extensive irrigation system whereby its water rights could be perfected. By August 1915, the Dry Gulch Irrigation Company had under its control sufficient water rights to irrigate 33,166 acres. An effective organization whereby water was managed within small geographic areas had also evolved. The Lake Fork drainage, for example, was divided into smaller sections: Section "A" to serve the upper portion of Lake Fork, Section "B" for Upper Dry Gulch and west valley, and finally Section "C" for the south bench. By early winter of 1905, the board of directors had approved canal plans for the Uinta side of the irrigation system and scheduled work to commence as soon as weather permitted. Several months later, other canals were adopted for the Lake Fork side with all directors agreeing that work would begin as quickly as possible.[56]

Experienced surveyors and engineers designed the gravity flow and earth canals for the Dry Gulch Irrigation Company. Because of the diverse geography of the basin, engineers grappled with designing canals along steep talus slopes and constructing wooden flumes or siphons to cross barren draws and deep gulches. Occasionally, engineers simply let the rugged terrain itself dictate the water course. The Cedarview Canal carried water along bench lands only to have the water plummet through a series of natural waterfalls and then resume its channeled course.



Measuring weirs such as this box on the U.S. Deep Creek Canal helped to ensure that each landowner received his fair water allotment.

The Cedarview Irrigation Company constructed the Cedarview Canal in 1908. The small irrigation canal, which featured a number of natural 40-foot waterfalls, was consolidated into the Dry Gulch Irrigation system in 1933. (Photographer: Jim Jurale, 1983.)

W. S. Woolf, an engineer with the Dry Gulch Irrigation Company, designed a system of three laterals to irrigate Hancock Cove, a rich farmland near Roosevelt. The Hancock, Sheehan, and Martin laterals all drew water from Dry Gulch Creek which in turn was supplied by the Lake Fork Canal. The Hancock Lateral, the longest of the three, diverted water above the other two laterals and irrigated the northern portion of Hancock Cove. The Sheehan and Martin laterals, on the other hand, divided the remainder of the water from Dry Gulch Creek through a concrete splitter regulated by wooden flashboards. The Martin lateral provided water to the central area of the cove while Sheehan irrigated the southern portion. Farmers directed the water onto their fields by simply cutting a hole in the side of the field ditch.[57]

Although the Dry Gulch Irrigation Company constructed some of its own canals, the company relied heavily upon Uintah Irrigation Project canals constructed by the Indian Irrigation Service. By 1916, the Indian Irrigation Service had expended nearly $1 million for canals, completing an elaborate system in which such companies as Dry Gulch obtained water-carrying rights. In effect, the BIA had unintentionally subsidized the irrigation projects of private companies and contributed greatly toward Mormon colonization of the Uinta Basin.

At the Dry Gulch Irrigation Company's monthly meeting in May 1906, the board of directors negotiated an agreement with the Department of the Interior to secure unused Indian water rights in exchange for maintaining, repairing, and often enlarging existing Uintah Irrigation Project canals. During that meeting, the board passed a resolution authorizing payment of $10,000 to the Government "for the faithful performance of the contract . . . ."[58]

The negotiations for water, however, were not entirely one-sided. Capt. C. G. Hall, representing the Ute Tribe, obtained some carrying rights in Mormon canals. For example, Uintah Number One, Bench, U.S. Lake Fork, and Uintah Canals carried both Indian and Mormon water. Irrigation water became so intermingled that at one point both organizations paid the same ditchrider to ensure that the water was distributed to its rightful owners. In addition, irrigation canal surveyors such as Edward Harmston received paychecks from both the Dry Gulch Irrigation Company and the Uintah Irrigation Project.[59]

Cooperation and conflict punctuated the initial relationship between Mormons and Utes in the construction and operation of their joint irrigation endeavors. The history of Uintah Number One Canal illustrates this pragmatic working alliance. In 1897, Colonel James Randlett, Acting Indian Agent, supervised construction of Canal Number One. The canal originally irrigated 320 acres of Indian land on Black Hawk and Nephi Benches. In 1908, however, the Dry Gulch Irrigation Company brought suit against the Department of the Interior to enlarge and jointly use the canal. The Fourth Judicial District Court ruled in favor of the Dry Gulch Irrigation Company providing that it pay for the extension of the canal. The company eventually spent nearly $15,000 to enlarge the canal to a length of 24,715 feet, 28 feet wide on top, 16 feet wide at the bottom, and having an effective depth of 2.75 feet. By 1933, the canal irrigated 3,490 acres, of which only one-third were Indian lands.[60]

During the years immediately following the land rush, several non-Mormon irrigation companies were also formed. The Dry Gulch Homesteaders Irrigation and Improvement Association of Denver, Colorado, known locally as the Denver Company, incorporated to secure water "for irrigation to every homesteader on equal terms and equal advantage on everything affecting the community. No Cliques, No Special Privileges." Several of these non-Mormon companies, due to inadequate financial reserves, were ultimately absorbed by the Dry Gulch Irrigation Company. Such was the fate of the Denver Company.[61]

By late January 1906, the Denver Company officials met with the Dry Gulch board of directors to negotiate this merger. In exchange for relinquishing all its water rights, the Denver Company received three seats at-large on the Dry Gulch Irrigation Company's board.[62]

Numerous canals such as the Uintah Number One Canal eventually carried both Indian and Dry Gulch Irrigation Company water. (Photographer, Jim Jurale, 1983.)

Numerous small, independent irrigation companies and land development associations also formed after the land rush. The Jepp Thomas Canal's stockholders consisted of a handful of farmers homesteading the west side of upper Duchesne River near Tabiona.

Before homesteading near Tabiona, Jessup Thomas, as a young Mormon sheepherder working for several farmers and ranchers in Heber Valley and the Kamas Prairie, had spent considerable time in the area herding sheep and cattle on leased Indian grazing lands. Thomas knew the northern portions of the reservation well. This knowledge proved useful in selecting lands during the land lottery in 1905.[63]

In typical Mormon fashion, Thomas, joined by his neighbors, excavated a canal to divert water from the Duchesne River to irrigate their farmlands. Work began on this so called "Turnbow Ditch" in the spring of 1906. The small cooperative planned a relatively high upstream diversion in order to irrigate some of the higher benchlands along the west side of the Duchesne River. However, the canal route required the construction of several hundred yards of wooden flumes along steep hillsides paralleling the river. Technical problems resulted in the failure of the ambitious project.[64]

Disappointed, Thomas decided to begin a second, scaled down irrigation canal. Although the Jepp Thomas Ditch irrigated a much smaller amount of land than the planned "Turnbow Ditch," the Jepp Thomas Canal, measuring 7 feet wide at top, 4 feet wide at bottom, with an effective depth of 2 feet, did provide needed water to 128 acres of land owned by Thomas and his neighbors.[65]

If the small, undramatic Jepp Thomas Canal represented the typical success story in the Uinta Basin, the Knight Canal reflected the basin's most spectacular failure. On June 14, 1909, a group of 40 homesteaders on Blue Bench, near Duchesne, met to plan an irrigation project to divert water from Rock Creek, a tributary of the Duchesne River, onto their farms. By July, the farmers had formally incorporated as a mutual irrigation district. Stockholders elected Joseph S. Birch, George Hemphill, and B.V. Barlow as the first trustees.[66]

This simple wooden headgate on the Jepp Thomas Canal diverted water from the west bank of the Duchesne River and provided water to Thomas' 128 acre homestead.

Within weeks, the Blue Bench Irrigation District Number One had retained Albert Halan, a licensed engineer residing in the basin, to design a system capable of diverting 100 second-feet of water from Rock Creek to the Blue Bench homesteads. Halan's design followed closely the plans which Cyrus C. Babb had earlier considered and then rejected due to the technological problems associated with the precipitous cliffs and deep, rugged hollows which any canal would have to traverse. Halan reasoned, however, that by enlarging a small existing Indian canal located near the head of the proposed Blue Bench Irrigation system, and by carefully constructing several miles of wooden flumes along the bluff and three high trestle flumes to cross the hollows, the water could be successfully diverted.[41]

The Blue Bench Irrigation Company quickly bonded itself under recently passed State legislation and persuaded Jesse Knight, a prominent Mormon entrepreneur, to back its venture. As owner of the Knight Trust and Savings Bank and Provo Construction Company, Knights involvement proved indispensable.

Knight's Provo Construction Company began work on the Blue Bench Canal in March 1913. The company immediately encountered difficulty in implementing Halen's plan. The idea of high trestle flumes traversing the numerous gullies was soon discarded in favor of wooden siphons. The siphons were constructed from Oregon fir (Douglas fir), 1⅝ inches thick, with ⅝ inch steel bands spaced from 4 to 10 inches apart. The diameter of the siphons was between 42 and 50 inches. Wooden flumes carried the water along the steep cliffs following the Duchesne River. These side hill flumes, constructed of native timber, had the following specifications:

Mud Sills	2 by 12 inches
Stringers	6 by 8 inches
Flume Sills	4 by 6 inches
Standards	2 by 6 inches
Top Braces	2 by 4 inches
Box	2-inch material
Battons	½ by 4 inches, or 1 by 4 inches[44]

After the canal crossed Benson Hollow, the topography became less severe and an earthen canal channeled the water to Blue Bench.

Detail of Knight Ditch wooden flume.

The $125,000 Blue Bench Canal was completed within the specified 2 year construction deadline and in time for the 1915 farming season. Unfortunately, trouble quickly followed. Work crews were kept busy repairing, plugging leaks, or rebuilding portions of the side-hill flumes throughout August of 1915. Washouts, falling boulders, and other natural problems resulted in a severely diminished flow from their planned 130 second-feet water flow. These problems persisted for the next 5 years. Disillusioned with the amount of available water and unable to meet the repayment schedule of their irrigation bonds, many homesteaders by 1920 had abandoned their farms. Despite the odds, Knight remained optimistic.[69]

As farmers defaulted on their payments, Knight gained control of much of the Blue Bench land. During the 1920s the Knight Investment Company hired ten laborers to maintain the canal. Other workers were retained to farm the lands Knight had acquired on the bench. Maintenance problems, however, continued to plague the under-capitalized company. The revitalization of the Blue Bench Canal suffered a mortal setback with the onset of the Great Depression. County records revealed that most of the lands owned by the Knight Investment Company on Blue Bench were sold for back taxes. The project continued to struggle through the 1930s and into World War II. By 1949, however,the company was finished and the water rights of the Blue Bench Canal sold to Duchesne County for a mere $621.30.[70]

The failure of the Knight Investment Company can be traced to difficult canal construction, marginal farming land, and national economic conditions—in this case the Great Depression. To a greater or lesser degree, these problems haunted the whole Uintah Irrigation Project in the 1920s and 1930s. There were, of course, some good years. Crop value on the Uintah Irrigation Project jumped from $366,395 in 1916 (with which 26,000 acres under cultivation equals $14 per acre), to $1,581,420 in 1918 (46,000 acres equals $33 per acre), to a rather astounding $2,423,893 in 1919 (43,705 acres equals $55 per acre).[71] However, such remarkable gains were primarily the result of the favorable market during the World War I years. In the 1920s, in spite of some success with alfalfa seed, farm prices plummeted downward, and they stayed down right through the depression years. It was not an easy time for the American farmer, and not surprisingly many Uinta Basin farmers abandoned their land, seeking a livelihood elsewhere. This was especially true of those who depended only on leased Indian lands. Most of those that did hang on went deeply into debt. Only 60 percent of white farmers in the 1930s made their water assessment payments, and only about one percent of the Indian Irrigation Service construction costs had been recovered.[72] Admittedly, many of the contracts were confusing and improperly written, leaving legal loopholes which settlers slipped through. However, the miserable recovery record of the Government ($11,510 had been collected of the $904,866 in construction costs) can be attributed to the fact that Uintah farmers were struggling for survival during a time of severe economic hardship.

A study of water development within the Uinta Basin confirms that the survey party sent to the basin by the Mormon Church in 1861 was not far off base when it reported that the area was "valueless, excepting for nomadic purposes, hunting grounds for Indians, and to hold the world together." It is not that intensive agriculture is impossible, but rather that there are so many other *superior* agricultural regions in the nation that the high altitude, short growing season, often poor soil, desert conditions, and limited water has meant that farming within the Uintah Irrigation Project has constantly been subsidized one way or another by the Federal Government. It has also meant that agriculture has been related to stock raising. For example, farmers have attempted raising fruit, particularly apples. But in a comparison in 1924, Utah County farms averaged 122 bushels per farm, while Uintah Basin farmers only produced about 17 bushels per farm.[73] Furthermore, because of the limited productivity, Uinta Basin farms have been larger. In 1940, over 40 percent of Uintah farms were from 30 to 99 acres, while in Utah County, 52 percent of farms were under 30 acres.[74] Small acreage is in keeping with the Mormon tradition, for as agriculture historian Govert Fite has stated: "The average size of farms in Utah in 1850 was 51 acres, but by 1860 this had been reduced to 25 acres. By keeping farms small," continued Fite, "the Mormons could spread the available water over a greater number of farms and provide more homes for more people."[75] Such a formula simply could not be successfully applied to the Uinta Basin with its thin, desert soils and short growing season.

The marginal nature of the farming land can also explain the slow progress of mechanization on Uintah farmlands. Granted, many of those who took up the land had little capital, yet that does not altogether explain why only 2 percent of the farms had tractors in 1925, and that this figure had barely grown to 8 percent in 1940—compared to a 23 percent figure for the nation.[76] The scarcity of capital necessary for mechanization, the marginal land, and the lack of national or regional markets dictated that farmers would work toward self sufficiency, relying as much on livestock raising as intensive farming.

Today, the canals are still operating and represent the lifelines in a valley that averages 5 to 7 inches of rainfall per year. Farmers continue to plant crops, primarily grains associated with the livestock business.

However, success must not be gauged only in economic terms. There were other measurements. Most important was the establishment of a new farming settlement representing a cultural expansion of Mormonism. For the Mormon community, farming and living off the land was a social system which they treasured. The Mormon image of the idyllic and virtuous life was summarized by immigrant William Mulder as he made his way to Utah in the early 1850s:

> We plow, we sow and irrigate,
> To raise the golden grain;
> And diligently labor
> To independence gain.
> Some haul the wood from canyons wild
> Some tend the flocks and herds
> And all our moments are beguiled
> By industry's rewards.
> My Valley Home, my Mountain Home,
> The dear and peaceful Valley.[77]

By the 1870s such a dream was fading. Productive land in Utah was no longer available. As Mormon Bishop Hans Jensen Halls explained in justifying the settlement of the San Luis Valley of Colorado: "Utah is becoming too crowded for us . . . . Because our poor bretheren and sisters who come to these tightly populated towns in Utah have no chance to get land to cultivate for themselves. . . ." it was necessary for "Zion's outspreading."[78]

Thus, by the 1890s, "Zion's outspreading" had ventured far from the Temple Center at Salt Lake City. Idaho, southern Colorado, and northern Wyoming had all been the subject of settlements to support Mormon farming communities. Placed in this light, one can readily understand the excited response of such Mormon leaders as William H. Smart and Joseph R. Murdock when it was rumored that substantial portions of the Uintah Reservation might be opened for white settlement. For them it presented a rare opportunity to halt the movement of Mormons from country to city, to establish an outlet for their expanding population, to create an effective social barrier to encroaching gentile settlements, and to continue a traditional way of life.

Unfortunately, the benefits to the white farmer generally did not extend to the Indian. Despite official pronouncements that the irrigation project would create a new generation of self-reliant and industrious Indians, very few Utes farmed the small irrigated tracts of land created by the Uintah Irrigation Project. Instead, the Uintah Irrigation Project was almost immediately deflected from its original purpose and quickly resulted in a trend toward greater white control of Indian resources. Although many Indians might protest the decisions to allocate tribal lands and to finance an expensive irrigation project with tribal funds, the partition and irrigation projects proceeded nonetheless.

Members of the Mormon Church viewed the unfolding Federal developments within the Uinta Basin from a very pragmatic and opportunistic perspective. They took full advantage of the existence of an underutilized Federal irrigation system. With characteristic community energy, they capitalized on the generous terms of the BIA's leasing and sales program, leveled and plowed the land, and built the necessary irrigation systems to ensure that this Mormon venture would succeed.

The year 1919 proved to be very productive for wheat farms such as this one within the Uinta Basin. (Photography courtesy of Fort Duchesne, entitled "Wheat in Deep Creek District, Fall 1919, on Uintah Irrigation Project, Utah.")

ENDNOTES

[1] *Inventory of the County Archives of Utah*, No. 24, Uintah County (Ogden, Utah: Works Progress Administration, 1940), pp. 26-27.

[2] Ibid.

[3] Elwood Mead and C.T. Johnston, *The Use of Water in Irrigation* (Washington, D.C.: Government Printing Office, 1900), pp. 197-202.

[4] Leonard J. Arrington and Dean May, "A Different Mode of Life: Irrigation and Society in Nineteenth Century Utah," in *Agriculture in the Development of the Far West*, ed. James H. Shideler (Washington, D.C.: The Agricultural History Society, 1975), pp. 8-9.

[5] "Ashley Central Irrigation Company Minute Book," Ashley Central Irrigation Company, Ashley Valley Water Users Association Office, Vernal, Utah. See also "Water Certificates Book No. 1, "Uintah County, Uintah County Recorder's Office, Vernal, Utah, p. 32.

[6] Ibid.

[7] Ibid.

[8] George Thomas, *The Development of Institutions Under Irrigation with Special Reference to Early Utah* (New York: MacMillan Company, 1920), pp. 42-56.

[9] "Ashley Upper Irrigation Company Minute Book," p. 96. See also "Manuscript History, Uintah Stake" (ms. in the Church of Jesus Christ of Latter-day Saints, Historical Department, Salt Lake City, Utah).

[10] Arrington and May, "A Different Mode of Life," p. 12.

[11] Utah Irrigation Commission, *Irrigation in Utah* (Salt Lake City, Utah, 1895), p. 54.

[12] Utah State University Extension Office, "Annual Report of the Uintah County Extension Work, 1918," Record group 19.1/1-47, Special Collections, Merrill Library, Utah State University, Logan, Utah.

[13] Ibid.

[14] Craig Woods Fuller, "Development of Irrigation in Wasatch County," M.A. Thesis (unpublished), Utah State University, Logan, Utah, 1973, p. 112.

[15] A good discussion of the Strawberry Valley Irrigation Project can be found in Thomas G. Alexander, "An Investment in Progress: Utah's First Federal Reclamation Project, The Strawberry Valley Project," *Utah Historical Quarterly*, 34 (Summer 1971), 286-304. For a more technological description of the project, see David Merrill, "An Historical Mitigation Study of the Strawberry Valley Project, Utah: Final Report," CRM Paper #9 (Orem, Utah: MESA Corporation, 1982).

[16] E.A. Hitchcock, Commissioner of Indian Affairs, to Leroy D. Thorman, Manager of the Raven Mining Company, 14 December 1904, NA, BIA, RG 75.

[17] H.P. Myton, Ute Indian Agent, to E.A. Hitchcock, 1 July 1902, NA, BIA, RG 75.

[18] *Vernal Express*, 19 May 1892.

[19] *Vernal Express*, 14 December 1893.

[20] *Vernal Express*, 31 August 1898.

[21] Andrew Jenson, *Latter-Day Saint Biographical Encyclopedia*, Vol. I (Salt Lake City, Utah: Deseret News Press, 1936), pp. 91-96.

[22] Leonard J. Arrington, *Great Basin Kingdom: An Economic History of the Latter-Day Saints, 1830-1900* (Lincoln, Nebraska: University of Nebraska Press, 1958), pp. 383-384.

[23] William Smart Diaries, Special Collections, Marriott Library, University of Utah, Vol. XIII, pp. 147-152.

[24] "Water Legislation, 1849-1880," in George Thomas, *The Development of Institutions Under Irrigation with Special Reference to Early Utah*, pp. 42-56. See also Robert G. Dunbar, *Forging New Rights in Western Waters* (Lincoln, Nebraska: University of Nebraska Press, 1983), p. 82.

[25] *Laws of Utah* (Salt Lake City, 1880), p. 37.

[26] Robert G. Dunbar, *Forging New Rights in Western Waters* (Lincoln: University of Nebraska Press, 1983), pp. 14-17.

[27] Gustive O. Larson, *The "Americanization" of Utah for Statehood* (San Marino, California: Huntington Library, 1971), pp. 301-2.

[28] Arrington, *Great Basin Kingdom*, pp. 83-384.

[29] Ibid.

[30] William Smart Diaries, Vol. XVI, pp. 110-112.

[31] William Smart Diaries, Vol. XIV, pp. 125-130.

[32] William Smart Diaries, Vol. XIII, pp. 147-152.

[33] George Albert Smith was first appointed U.S. Land Office Receiver for Utah February 10, 1898, and was reappointed March 27, 1902. He was sustained as an apostle in October 1903. Jenson, *Latter-Day Saints Biographical Encyclopedia*, Vol. 1, pp. 776-777.

[34] William Smart Diaries, Vol. XIII, pp. 179-180.

[35] Frederick E. Hoxie, *A Final Promise: The Campaign to Assimilate the Indians, 1880-1920* (Lincoln, Nebraska: University of Nebraska Press, 1984), pp. 156-158.

[36] William Smart Diaries, Vol. XIV, pp. 33-38.

[37] William Smart Diaries, Vol. XIV, p. 108.

[38] For a discussion of the farm-village settlement strategy, see Lowry Nelson, *The Mormon Village: A Pattern and Technique of Land Settlement* (Salt Lake City: University of Utah Press, 1952).

[39] Wallace Stegner, *Mormon Country* (Lincoln, Nebraska: University of Nebraska Press, 1942), pp. 30-31.

[40] *Salt Lake Tribune*, 7 June 1905.

[41] William Smart Diaries, Vol. XV, pp. 91-96.

[42] Jenson, *Latter-Day Saints Biographical Encyclopedia*, Vol. I, p. 361.

[43] *Salt Lake Tribune*, 2 July 1905.

[44] A detailed account of the controversy can be found within almost every issue of the *Salt Lake Tribune* between late June and August 1905.

[45] William Smart Diaries, Vol. XV, p. 132.

[46] William Smart Diaries, Vol. XVI, p. 93. See also Articles of Incorporation, Dry Gulch Irrigation Company, Roosevelt, Utah.

[47] William Smart Diaries, Vol. XVI, pp. 46-47.

[48] Articles of Incorporation, Dry Gulch Irrigation Company.

[49] Ibid.

[50] *Salt Lake Tribune*, 1 August 1905.

[51] Ibid.

[52] *New York Times*, 2 August 1905.

[53] *Journal of History of the Church of Jesus Christ of Latter-Day Saints*, 11 August 1905.

[54] Ibid.

[55] Record Book A, Dry Gulch Irrigation Company, Roosevelt, Utah, pp. 46-47.

[56] Ibid.

[57] Minute Book, Dry Gulch Irrigation Company, p. 368.

[58] Record Book A, Dry Gulch Irrigation Company, p. 52.

[59] C.C. Early to J.M. Bryant, 22 June 1912, Uintah and Ouray Reservation Office, Fort Duchesne, Utah.

[60] Certificate of Appropriate Water, No. 208, Application No. 627, Dry Gulch Irrigation Company. See also Decree, Dry Gulch Irrigation Company v. Wm. H. Coltharp, et al., District Court of the Fourth Judicial District of the State of Utah, 30 October 1908, and Project Engineer to John F. Truesdell, Uintah Irrigation Project Records, 17 December 1915, State Engineers Office File 43-3037, No. 623.

[61] Record Book A, Dry Gulch Irrigation Company, p. 37.

[62] Ibid.

[63] Interview with Owen Van Tassell by James Jurale and Craig Fuller, 1 August 1983. See also V. Garth Norman, "Cultural Resources Survey of the Duchesne River Area Canal Rehabilitation Program," 12 February 1982 (unpublished ms., MESA Corporation, Orem, Utah).

[64] Ibid

[65] Ibid

[66] Jesse Knight Papers, Knight Investment Company, "Records of Minutes of the Blue Bench Irrigation Destrict No 1," Special Collections, Harold B. Lee Library, Brigham Young University, Provo, Utah

[67] Ibid

[68] Miscellaneous Records Book No. 2, Duchesne County Recorder's Office, Duchesne County Courthouse, Duchesne, Utah

[69] Jesse Knight Papers, "Records of Minutes of the Blue Bench Irrigation District No 1."

[70] Ibid

[71] Albert H. Keale and C.R. Olberg, "Report on Crop Damage," Uintah Irrigation Project, Utah, pp. 107-108, in Irrigation Division, Gen. Corres. Files, 3 or 25, BIA, RG 75, NA.

[72] A.L. Walker, "A Study of Economic Conditions on the Uintah Irrigation Project, Utah," pp. 59-68, 73, *passim*.

[73] U.S., *Census of Agriculture*, Part III, Western States, 1925

[74] Ibid., Vol. I, Pt. 6, Mountains and Pacific

[75] Gilbert C. Fite, *The Farmers' Frontier 1865-1900* (New York: Holt, Rinehart and Winston, 1966), p. 179

[76] Gilbert C. Fite, *American Farmers* (Bloomington, Indiana: Indiana University Press, 1981), p. 70.

[77] William Mulder's poem may be found in Leonard J. Arrington, Davis Bitton, *The Mormon Experience: A History of the Latter-Day Saints* (New York: Vintage Books, 1980), p. 142

[78] Ibid

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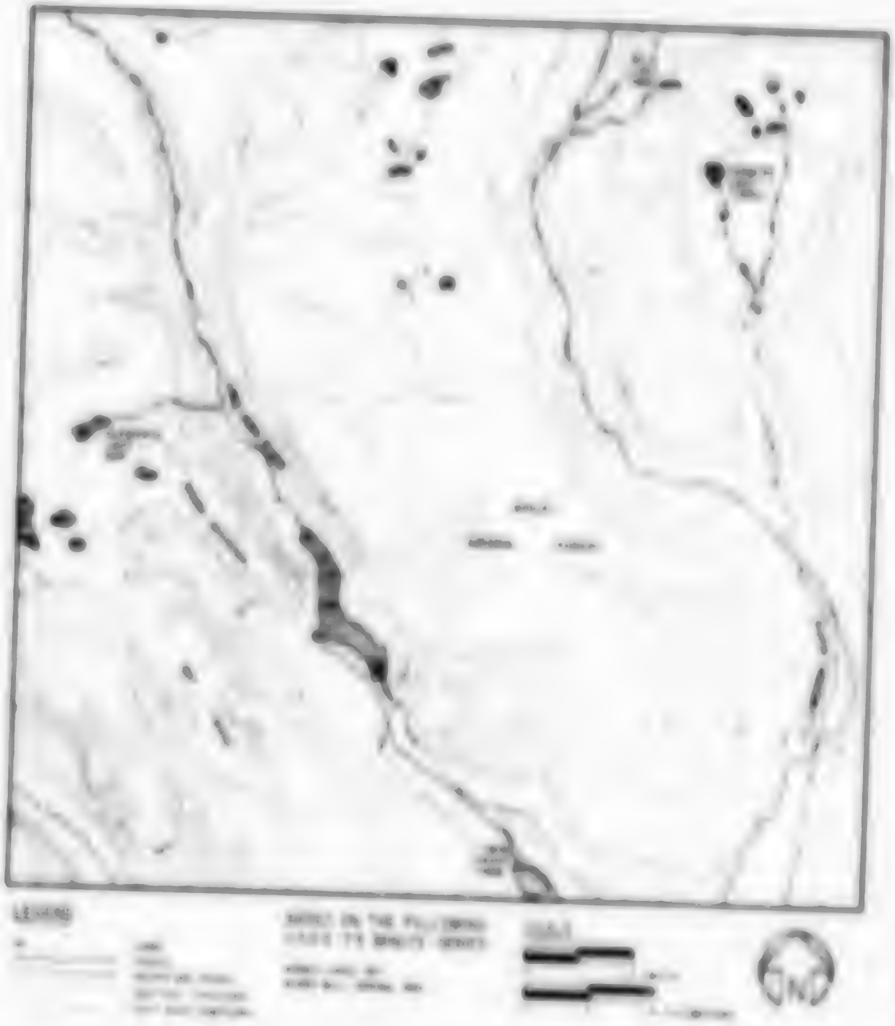
HISTORIC DAMS
OF THE UINTA MOUNTAINS

THE FIRST DECADES OF THE 20TH CENTURY CLEARLY DEMONSTRATED THAT THE EXISTING IRRIGATION SYSTEM WAS INADEQUATE TO MEET THE AGRICULTURAL NEEDS OF ALL UINTA BASIN FARMERS. NOT SURPRISINGLY, MORMON FARMERS AND THE UNITED STATES INDIAN IRRIGATION SERVICE MOVED QUICKLY TO HARNESS THE MOUNTAIN RUNOFF WHICH FLOWED THROUGH AND OUT OF THE BASIN EACH SPRING. THE MOUNTAIN WATERS WERE STORED BEHIND SMALL EARTH FILL OR MASONRY DAMS AND THEN RELEASED DURING THE HOT GROWING SEASON. THE MAJORITY OF THE DAMS ALLOWED FARMERS TO CONTINUE THROUGH SHORT PERIODS OF DROUGHT WHILE THE LARGER STRUCTURES FACILITATED FURTHER AGRICULTURAL SETTLEMENT IN THE BASIN. THESE DAMS MARKED THE CULMINATION OF EARLY IRRIGATION EFFORTS IN THE UINTA BASIN.

THIS PROJECT WAS UNDERTAKEN BY THE HISTORIC AMERICAN ENGINEERING RECORD (HAER) OF THE NATIONAL PARK SERVICE'S (NPS) ROCKY MOUNTAIN REGIONAL OFFICE, IN COOPERATION WITH THE UPPER COLORADO REGION, BUREAU OF RECLAMATION, UNDER THE DIRECTION OF HISTORIAN GREGORY D. KENDRICK (NPS). FIELD WORK FOR THIS PROJECT WAS COMPLETED DURING [illegible] BY [illegible] (UNIVERSITY OF WYOMING), [illegible] (UNIVERSITY OF WYOMING), CLAYTON B. FRASER (LOVELAND, COLORADO), AND HISTORICAL ARCHITECT [illegible] (NPS).



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CHAPTER THREE

EXPANDING THE SYSTEM

by Clayton B. Fraser and James A. Jurale, with Robert W. Righter

The first decades of the 20th century clearly demonstrated that the Uinta Basin was a hard country in which to prosper. The relatively high altitude, attendant short growing season, and thin desert soil contributed to the problem. The limited water supply, however, was of the greatest concern to Uinta Basin farmers. Soils could be improved with chemical fertilizers, and crops could be found which would survive the harsh growing season. Unexpected water shortages, however, could devastate existing farmlands. Moreover, an inadequate water supply precluded any thought about future agricultural expansion. Not surprisingly, farmers moved quickly to impound the mountain runoff which flowed through and out of the basin each spring. These mountain waters could be safely stored behind small earthen or concrete dams and then be released during the dry months of July and August.

Overview of Bluebell Lake Dam built by Farmers Irrigation Company in 1930. Bluebell Lake was a natural pool located at the base of a rock stream ridge which formed the western wall of the Garfield Basin.

These waters originated high in the Uinta Mountains. This relatively narrow and rugged range of the Rocky Mountans forms a unique, perpendicular, east-west link in the Rocky Mountain chain. The snowmelt from their north face flows into the broad, arid Wyoming Basin of southwestern Wyoming. The southface of the range forms the headwaters for three river drainage systems—Lake Fork, Uinta and Whiterocks. These small streams drop precipitously through rocky canyons and eventually flow through shallow valleys in the Uinta Basin. While the basin receives between 5 and 7 inches of rainfall annually, precipitation in the high Uintas averages approximately 30 inches.[1] These mountains comprise an important, indeed crucial, watershed for the region.

William Smart and the directors of the Dry Gulch Irrigation Company fully understood the importance of water storage as a way to increase water availability and had taken steps prior to the initial homestead entry to secure storage rights. By 1905, Dry Gulch, which would become the most influential irrigation company in the basin, had applied not only for diversion rights in the streams but also for storage rights in many of the Uinta Mountain watershed lakes.

Smart had been encouraged to make the applications by the formative policy of the U.S. Forest Service, created in 1905. Guided by the utilitarian precepts of Gifford Pinchot, America's first professional forester, the Forest Service viewed natural resources such as timber and water as resources to be used wisely and efficiently. Pinchot believed that "the fundamental principle of the whole conservation policy is that of use, to take every part of the land and its resources and put it to that use which will serve the most people."[2] Although this utilitarian ethic clashed with a growing number of preservationists who promoted the intangible values of wilderness areas, preservationist sentiments generally had little chance for success when challenged by developmental pressures. This historical trend was clearly reflected when President Woodrow Wilson signed the bill to dam Hetch Hetchy Valley within Yosemite National Park on December 19, 1913. Forest Service policy, and indeed traditional American values, simply did not include "locking-up" natural resources within national forests for esthetic or inspirational values. Forest Service managers would pursue this utilitarian conservation policy when issuing special use permits for reservoirs in the Uinta Mountains.

The Dry Gulch Irrigation Company was not the only irrigation company seeking Forest Service special use permits for reservoirs. Ten years after the Dry Gulch Irrigation Company had secured its mountain storage rights from the Forest Service, a second irrigation company began to look to the mountains for a solution to its water problem. The Farnsworth Canal and Reservoir Company, incorporated in 1908, provided water to farms around Mountain Home and Talmadge near the center of the basin. Although it was one of the larger and older irrigation companies in the basin, Farnsworth held water filings secondary to both the allotted Indian lands' primary rights and the Dry Gulch Irrigation Company's water filings. As early as July 1915, company director George O. Lindsay suggested that Farnsworth should investigate reservoir sites to prepare for low-water years.[3] There had always been a degree of uncertainty among Farnsworth shareholders about the sufficiency of water supply for their secondary filings, and a means of storing water would consolidate their position and provide a measure of insurance against the drought years.

Shortly after Lindsay's suggestion, the Farnsworth Board of Directors employed engineer Austin G. Burton to investigate and report on potential reservoir sites.[4] Accompanied by a guide, Burton reconnoitered the headwaters of the Lake Fork River and reported back that he had found four lakes with a total storage capacity of approximately 5,000 acre-feet of water.[5]

On July 22, 1915, the Farnsworth Canal and Reservoir Company filed for storage rights on Brown Duck, Kidney, and Island Lakes (permits #6353, 6354, and 6355) with the Utah State Engineer's Office. (The identity of the fouth lake identified by Burton is unclear. Perhaps it was Clements Lake, further north in the watershed, for which the Dry Gulch Irrigation Company already held the storage rights.) The three permits to store 324, 435, and 851.2 acre-feet of irrigation water, respectively, were approved on April 4, 1916, with the understanding that the dams for impounding the water would

Downstream face and toe of Kidney Lake Dam. The largest of the impounded high mountain lakes in the Upalco Unit, the reservoir was one of three lakes in the Brown Duck Basin dammed by the Farnsworth Canal and Reservoir Company.

be completed by November 1, 1918.[6] Later the company found that Kidney Lake could provide more storage than originally thought and on January 22, 1917, refiled for an additional 1,500 acre-feet. Farnsworth increased the capacity again the following year with yet another application for an additional 1,700 acre-feet.[7]

The risk the farmers in the basin ran became clear in 1918. That year, about 50,000 acres of farmland required water from the Lake Fork drainage system. With a total flow of 135,000 acre-feet during the 6 irrigating months, the water should have been sufficient to irrigate 53,000 acres if impounded and controlled. However, no means of storage had been built to hold the spring runoff, and the flow in August was only sufficient for 26,000 acres.[8] During the summer of 1919, with more acreage in cultivation and less water in the streams, the situation worsened. In that year the Lake Fork drainage delivered the lowest volume of water recorded to date, and 8,000 acre-feet of storage would have been required to supply the deficiency in normal stream flow during the irrigation season.[9] The farmers' conclusion was inescapable: unless a considerable amount of storage was developed, some of the lands that had previously been cultivated would have to be abandoned.

The Indian Irrigation Service had arrived at the same conclusion. The drought of 1918-19 prompted Supervising Engineer H.W. Dietz to order an investigation of possible high-country irrigation storage reservoirs on the Whiterocks, Uinta, Yellowstone, and Lake Fork watersheds. Conducted in the summer and fall of 1919, the original purpose of the investigation was to locate sites which could be developed by the Uintah Irrigation Project to supplement the low water flow of the rivers. Before the survey had progressed very far, however, it became apparent that earlier searches by white individuals and private irrigation companies had resulted in filings on all sites that possessed "even remote possibilities." Nevertheless, the survey was completed as the Indian canals held first filings on all of the streams. Additionally, "it became desirable that the Indian Irrigation Office have general information at least concerning these prospective developments."[10]

In his "Report on the Results of Storage Investigations, 1919," Uintah Irrigation Project Assistant Engineer H.R. Leach concluded that no feasible storage sites in the mountains were available for the Indian Irrigation Service. The four or five sites which, in his opinion, were large enough to interest the Indian Irrigation Service were under development or had been previously secured by filing. "The balance of forty or more sites filed on," the engineer continued, "are obviously impractical or too small for use by the Indian Canals."[11] Leach maintained that the Indian Irrigation Service should look below the Uinta Mountains to find storage possibilities and recommended that an investigation of the lower country be made as soon as possible.

The report was not optimistic about the feasibility of private development of high-country reservoir sites. Leach ascertained that some of the basins were located too high on the watershed to have the drainage area necessary for a substantial water supply. Most of the lakes would require difficult construction to impound the water, he maintained, and siphons would have to be constructed or spillways excavated to store water in some. Other lakes would require extensive dams, necessitating considerable amounts of capital investment. While there was plenty of rock and timber available in the immediate vicinity, he reasoned erroneously that earth fill in the mountians would be extremely difficult to obtain. And with no access roads into the mountains, the cost of transporting building material in from the outside was "absolutely prohibitive."[12]

In light of the survey's investigations, Leach considered it probable that many of the private applications for storage rights would be allowed to lapse, or if pressed through construction, the projects would ultimately fail. He recommended capacity curves be plotted for the natural lakes and their tributaries to prevent a loss of flow to Indian canals if storage on a number of such small feeder streams was developed. This data would be helpful since he foresaw difficulties in the regulation and operation of future reservoirs due to their remoteness.[13] Leach warned, "Reservoirs which are failures and which destroy natural stream storage or which are improperly operated may cause serious loss to the prior filers [Indians]."[14]

Supervising Engineer H.W. Dietz agreed that any storage scheme was bound to fail and should be discouraged from the start. "Nevertheless," he stated, "we should not discourage any who desire to develop such sites as appeal to them."[15] In his opinion, an Indian irrigation policy of cooperation and assistance would benefit the Indian Irrigation Service in a number of ways. First, Dietz believed, any storage which would relieve the situation of the secondary appropriators would soothe the growing tension between them and the Indians, thus benefiting the basin as a whole. Second, properly constructed reservoirs would help regulate the normal channel flow from which both white and Indian farmers diverted, reducing loss through seepage. Even in a low water year, the characteristic mountain snowpack produced an early summer runoff peak that exceeded the needs and capacities of the water users for their crops. This was followed by lower flows in late summer which could not satisfy irrigation needs. In so stating, Dietz, of course, was simply making the classic case for irrigation dams. Finally, he maintained, high-country water storage would decrease the amount of culinary water taken by whites from normal flow as secondary filers could not use other water while holding stored water.

Although they may have been encouraged by a supportive Indian Irrigation Service policy, a number of irrigation companies had already filed for the mountain reservoir storage rights with the Utah State Engineer's Office. In the following two decades, these companies and a handful of private individuals ventured into the high country to construct dams, cut drainage channels, and install control structures on 24 high-country glacial lakes on the Lake Fork, Uinta, and Whiterocks headwaters.

BROWN DUCK BASIN DAMS

The Farnsworth Canal and Reservoir Company was the first to begin actual construction. At the same time the company applied for water storage rights on Brown Duck, Island, and Kidney Lakes, it applied with the Ashley National Forest for permission to construct dams to create the reservoirs and control the outlet flow. On May 8, 1916, the Forest Service issued special use permits to Farnsworth for the purpose of "constructing, using and maintaining a dam and reservoir [on each lake] for storage of irrigation water."[16]

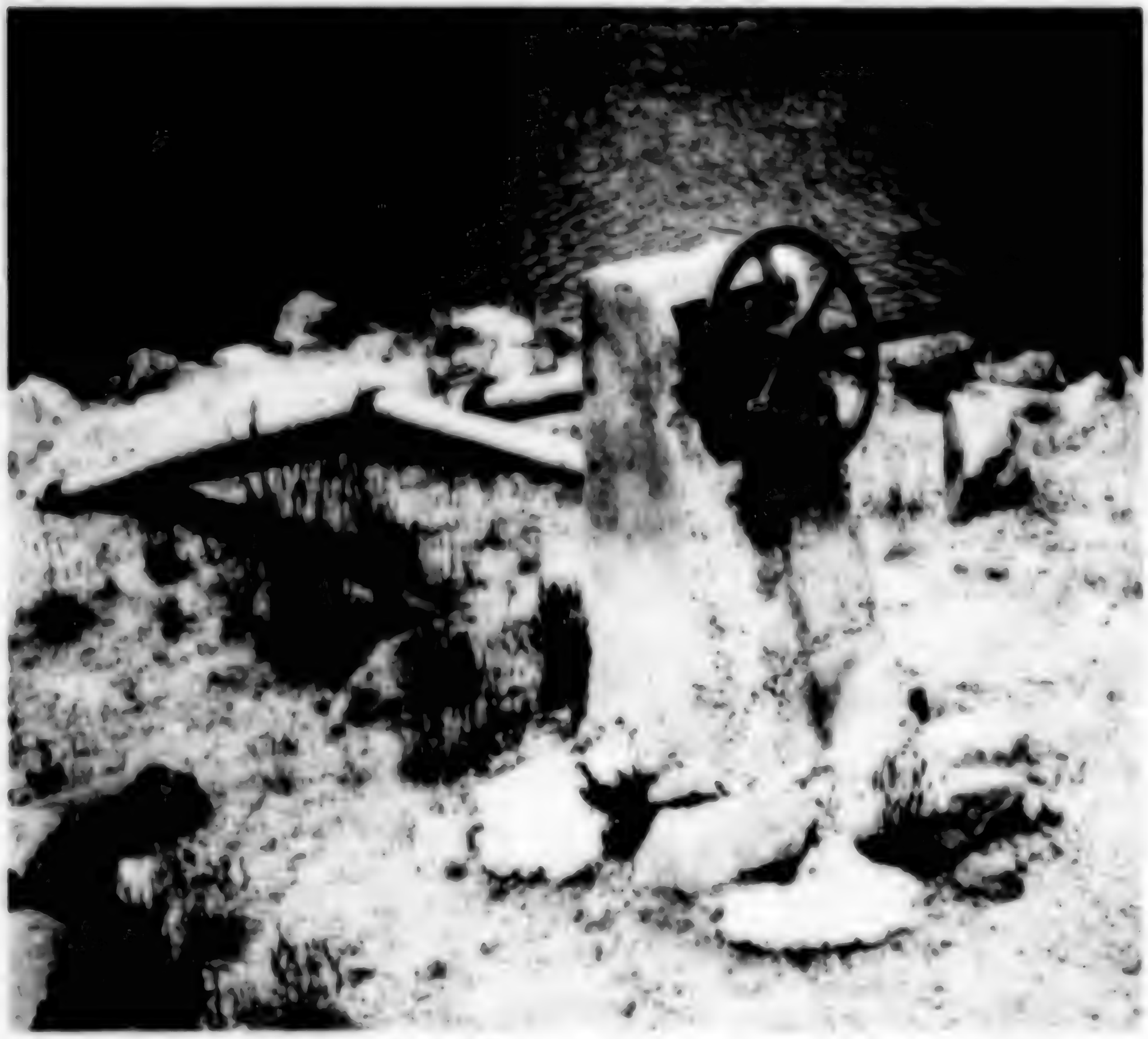
The three natural lakes were located in the remote Brown Duck Basin and were inter-connected. Kidney Lake was the northernmost and by far the largest of the three. It drained into Island Lake, an irregular body of water made up naturally of two smaller lakes separated by a narrow ridge. Island, in turn, drained into Brown Duck Lake, the smallest of the three lakes. As the lowest lake in the basin, Brown Duck functioned as the regulation point for water released from the three lakes. From Brown Duck, the water flowed throught the natural outlet on the lake's east end, into Brown Duck Creek, and joined the Lake Fork River at the present site of Moon Lake Reservoir. Not far from here was the headgate for the Farnsworth Canal, which could be regulated in concert with the release from Brown Duck Lake to redivert the stream flow into the canal.

The Farnsworth Canal and Reservoir Company engaged the engineering firm of Caldwell and Sorenson to design the dams and reservoirs. The engineers completed the drawings for Kidney Lake in December 1916, and for Brown Duck and Island Lakes by the following February.[17] The plans called for the terminal moraine on Brown Duck Lake to be excavated by 9 feet, an outlet pipe installed, and the dam built 14 feet above the lake level so that the total dam height would be 23 feet and the total water depth would be 19 feet. Kidney Lake was to be cut 10 feet below the original lake level, the outlet pipe installed, and the dam built an additional 15 feet above the original lake level, making the total height of the dam 22 feet. The water level would be 18 feet.[18]

On March 24, 1917, the *Duchesne Record* reported that the Farnsworth directors had rejected all bids from area contractors for the construction of the three reservoirs as too high by at least $10,000. The work instead would be carried out by hired laborers supervised by the company's management. George G. Lindsay, George O. Lindsay's son and secretary of the company, stated that Farnsworth proposed to spend about $35,000 on reservoir construction that year. The work, he said, was being undertaken so landowners served by the canal would benefit during low water season. The construction of the dams had a decidedly beneficial effect on Farnsworth stock "which is now being held at a higher price than ever prevailed in its territory."[19]

In April 1917, as the United States entered the Great War, farmers throughout the country were told that the fate of the war and of the nation depended on them. Similarly, crop growers in the Uinta Basin were exhorted by the Government to produce more crops as a valuable national service. The *Duchesne Record*, for example, encouraged the Uinta Basin farmer "to increase production, particularly of food crops. If he has control of tillable land not in use, or money lying idle, or labor unemployed — he should extend operations so as to employ those resources to the fullest extent . . . to turn out a greater quantity of food crops than ever before."[20] Given this climate, the damming of lakes and the proposed expansion of crop production by the Farnsworth Canal and Reservoir Company was viewed as a patriotic endeavor.

The Farnsworth crew first cut a rough road into the lake area in the fall of 1916. Teamsters driving horse teams hauled most of the construction materials, including cement, pipe, lumber, and headgates to the lakes during that and the two succeeding winters. According to Fred Lindsay, "It was easier to haul the material in on sleighs because after the snow was packed down it made the road much smoother for the horses to run on."[21] The sleigh, "a frontrunner with the tongue on," was fitted with "a good bed or box and loaded with provisions." The workers set up a tent camp at each of the lakes and built a main cabin at Kidney Lake where the material was stored.[22]



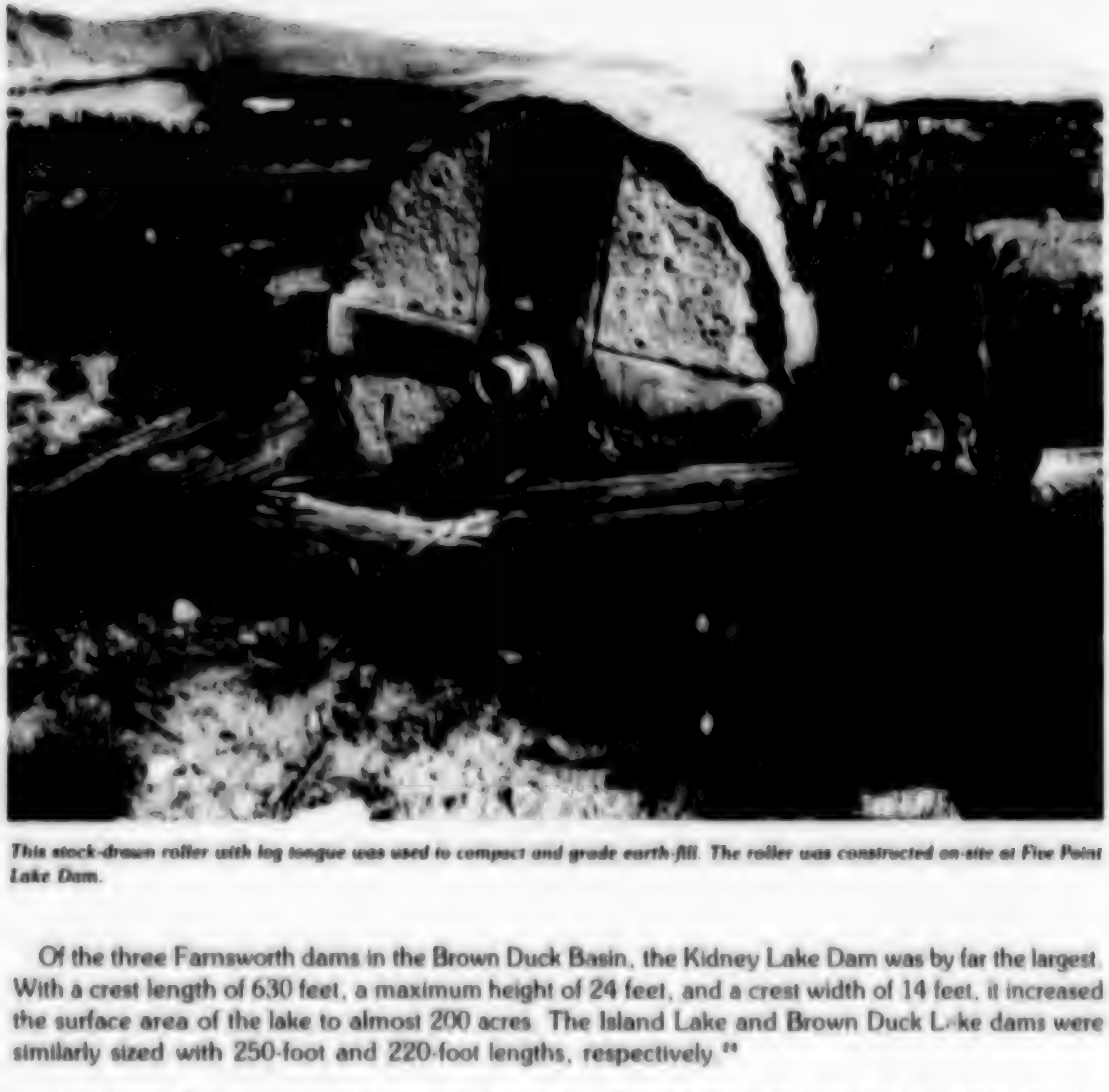
This outlet gate wheel and stem on Brown Duck Lake Dam served as the regulation point for water released from Kidney, Island, and Brown Duck Lakes.

Actual construction on the dams began in the spring of 1917. The remote location, prevailing technology, and overriding need for economy dictated that the dams be constructed of local materials: primarily earth and rock. To excavate, move, and grade the earth, the men used equipment such as plows, rollers, graders, tongue scrapers, and rooters, pulled by horses. Typically, after the first blasting with dynamite to loosen the rock and soil, one team pulverized the ground with a plow or rooter. Then other teams pulling scrapers moved the earth-fill to the dam site.[23] Finally, a team pulling a roller compacted and graded the fill.

All three dams—and the majority of those that followed in the Uinta Mountains—employed simple earth-fill construction. Among the most rudimentary of structural types, the earth-fill dam typically consisted of a water barrier of compacted clay core, covered with tons of earth fill for height and ballast,

It was much easier to haul materials into camp on sleighs and sleds over snow packed terrain. (Photograph entitled, "Beginning the journey on skis to the head of the Provo River, April 15, 1913. Union Reservoir Company snow survey. Dean Clyde, Mode Fraughton, C.S. Jarvis, C.E.;" courtesy of Ardean Anderson, Kamas, Utah, April 1913.)

Steel, team-drawn earth scrapers such as this one left behind at Five Point Lake Dam removed and hauled earth-fill to dam sites and faced with stone veneer for erosion control. The earth fill which made up the bulk of the dam's weight was scooped from nearby open pit operations, dumped over the [illegible], compacted, and graded using horse-pulled equipment. The finish-graded earth-fill structure was then covered with large-scale granite stone riprap, typically laid 1 to 2 feet thick. The upstream and downstream surfaces of the dams were generally graded with a 1:1 slope.



This stock-drawn roller with log tongue was used to compact and grade earth-fill. The roller was constructed on-site at Five Point Lake Dam.

Of the three Farnsworth dams in the Brown Duck Basin, the Kidney Lake Dam was by far the largest. With a crest length of 630 feet, a maximum height of 24 feet, and a crest width of 14 feet, it increased the surface area of the lake to almost 200 acres. The Island Lake and Brown Duck Lake dams were similarly sized with 250-foot and 220-foot lengths, respectively.[24]

At the base of the maximum section of each dam (usually near the center of the dam's length), an outlet pipe was placed. A steel, shovel-headed headgate typically covered the upstream face of the outlet pine. Mounted either vertically or roughly parallel with the inclined surface of the dam on a rigid steel stem guide, the gate was connected via the steel valve stem at the top of the mechanism. The flow rate through the outlet was controlled by rotating the gate wheel, which raised or lowered the gate by moving the threaded stem. All three Farnsworth dams were built using this method of construction.

In technological terms, these dams represented neither the most advanced nor the most primitive of their type. The simplest handmade dikes, such as the one that Uinta Basin farmer Brigham Timothy built over the outlet of East Timothy Lake around 1920, reflected one end of the spectrum. Timothy's 12- by 18-foot dam consisted of little more than stacked blocks of sod with a simple wood outlet gate at one end. Immense earthen dams built elsewhere in the West during the second decade of the 20th century provided a sharp contrast to these smaller structures. The largest and most sophisticated of

Inclined, shovel-nosed outlet gate, stem, stem guide and wheel, at Pot Lake Dam. Water flow through the outlet was controlled by rotating the gate wheel, which raised or lowered the gate by moving the threaded stem.

these was the Calaveras Dam in California, completed by the Spring Valley Water Company in 1915. With a crest length of 1,260 feet, a base width of 1,312 feet, and a maximum height of 240 feet, this clay core structure was the highest earthen dam in the world and was monumental by any standard.[25]

The largest earthen dam in Utah, and one of the largest in the country, was the Mammoth Dam, located 12 miles east of Fairview in the central part of the state. The Price River Irrigation Company began construction of this dam in 1908 to impound waters of Upper Gooseberry Creek for farmland near the towns of Colton and Price. Like the Uinta Basin lakes, the Mammoth Dam site was remote, located high in the Wasatch Mountains. The irrigation company therefore undertook the construction using man- and horsepower, dragging equipment and materials over a 12-mile-long dugway to the site. Despite this, the Mammoth Dam was both immense—designed to be almost 125 feet tall when completed—and relatively sophisticated. The dam featured earth-fill over a buttressed concrete core wall, with two peep wells to drain the dam, and a concrete variable height outlet tower located near the upstream face. The Mammoth Dam was designed to be heightened in 10-foot steps as the irrigation company's needs expanded. By late 1915, its height had reached 67 feet.[26] As its name implied, the Mammoth Dam represented the most ambitious of its type undertaken in Utah at that time. Unlike the Mammoth Dam, the three Farnsworth structures, with their short, sloped-wall construction, freeboarded concrete spillways, and relatively simple outlet culverts, fell more within the mainstream of dam construction.

To finance its dam work, the Farnsworth Irrigation Company voted in October 1917 to issue bonds for sale at $45,000, payable in 20 years. The bonds enabled the company to refinance the company's indebtedness and to continue the construction of canals, ditches, and reservoirs.[27] These bonds were never sold, however, and were instead used as collateral for various loans.

Additionally, during the construction years, Farnsworth levied a number of assessments against the stockholders. These ranged from 5 cents per share on August 9, 1917, to 37 cents per share on August 16, 1918. Many of the stockholders worked off their assessments by furnishing teams and labor on the reservoirs. Others paid their assessment to the company in cash, which paid wages for the workmen. The wages varied from $5 per day for a man and team and $2.50 per day for a single hand (laborer) in 1916, to $7 per day for a man and team and $3.50 for a single hand in 1918.[28]

The dam construction proved more costly than could be funded by the levies, and Lindsay turned to other avenues of funding to alleviate the company's strained finances. As the work neared completion in June 1918, Farnsworth representatives approached agents of the Church of Jesus Christ of Latter-day Saints, asking that the church purchase some of the bonds. In September, Mormon Elders A. Ivins and R.R. Lyman inspected the company's property and water systems. Satisfied with their inspection, the church agreed to a $15,000 loan.[29]

In exchange for the loan, the church demanded that the bank be given $22,000 worth of company bonds as collateral. Although the bonds had been traded below par value, the loan appeared to solve Farnsworth's most pressing financial problems, and construction of the dams could be completed. The town of Mountain Home, the trailhead to the construction site—located just west of Lake Fork River, about 10 miles south of Brown Duck Lake—benefited economically from the reservoir work. In 1917 the town supported two general stores, one hotel, the Farnsworth Company building (built in 1914), one pool hall,and a dance—or community—hall which was also used as a church house.[30] Canceled checks for work done on Kidney Lake in 1917, drawn by Farnsworth on the Bank of Duchesne, indicate that the irrigation company maintained a substantial payroll and purchased most supplies locally. In August of that year, the *Duchesne Record*'s Mountain Home correspondent reported, "There have been a great many freight teams arriving during the week. The stores are getting quite well filled up and the commissary at the lakes is supplied also."[31]

Naturally, with 80, predominantly young, "single hands" and 35 men and teams employed at the reservoir sites, all was not work. Numerous dances were held at the Mountain Home community hall when men came down to the town on weekends. Visitors, "all those seeking pleasure and a good time," were encouraged to visit the reservoirs, and "teams coming down from the lakes reported a very nice crowd and a still better time."[32] Construction progressed despite all the fun, and by the end of 1918, Kidney Lake was dammed. The dams on Brown Duck and Island Lakes were completed in the fall of 1919.

The Farnsworth Company released impounded water from Kidney and Brown Duck Lakes for the first time in August 1917, before completion of the dams. The company was unable to divert the flow at its canal headgate, however, because the gate had been locked closed by the watermaster. Apparently, Farnsworth had stored water in partially completed Kidney Reservoir for some time before the date allowed in their water application. Legally, this water belonged to the BIA. The matter was resolved by U.S. Court Referee Borgquist who ruled that "inasmuch as the season has been an unusual one and the normal summer flow of streams had been in excess of previous years, the Farnsworth were [sic] entitled to such excess, which had been impounded."[33] Starting at that point, Farnsworth diverted water from Lake Fork and irrigated the farmland with its canals at Mountain Home and Purple Bench. Stockholders grew crops of wheat, oats, barley, and potatoes on these lands, as well as alfalfa and native grasses for livestock feed.[34]

Two years after completion of the last of the three high mountain dams by the Farnsworth Company, the Ashley National Forest granted a special use permit to the Dry Gulch Irrigation Company for the construction of a dam on the fourth natural lake in the Brown Duck Basin. Located at an elevation of 10,340 feet, approximately 3½ miles north of Brown Duck Lake, Clements Lake was the highest of the four bodies of water and was located closest to the headwaters of the watershed of the basin. The Forest Service permit in 1921 gave Dry Gulch permission to use about 81 acres of Clements Lake surface. Later that year the company built a small log dam across the lake's natural outlet on its east side to prove up on the water.[35]

Five years later Dry Gulch employed engineer Louis Galloway to survey the dam site and blaze a pack trail from the trailhead at Moon Lake. Pete Wall, a local cowboy, packer and horse trader, assisted Galloway as rodman and guide. Wall later received the contract to construct the new dam. Using pack trains of 9 to 10 animals, Wall hauled cement, lumber, headgate, pipe, grain, four horse scrapers, slip scrapers, tongue scrapers, and even a cook stove, into the dam construction site. His contract paid 50 cents per 100 pounds on a trip which took about 3 hours in each direction.[36]

Once Wall packed a single headgate weighing almost 500 pounds on the back of a mare, counterbalancing the load with plow shares. On another trip he carried two boxes of giant powder (dynamite) on one horse, with the percussion caps packed separately behind his riding mount's saddle. "The pack mare reared back," according to Wall, "the rope broke, and she rolled plum over and down the hill with the two boxes of powder." Wall spurred his own horse desparately up the trail to escape the anticipated blast, but miraculously the dynamite did not explode.[37]

Construction of the new dam began later in 1916. The work crew first demolished the original log structure and then cemented a new headgate in place and packed clay around the outlet pipe. The Dry Gulch crew ranged from 15 to 20 men who lived in canvas wall tents and ate in a cook shack on a table crudely made of logs. To build the dam, they used the same construction methods as had the Farnsworth crew, blasting the rocks on the surface of the ground to break them up and scoop the earth-fill below. A teamster leading a four-horse hitch pulled a fresno scraper to scrape the fill and deposit it onto the dam. A slip scraper—a large steel bucket with a bail on the side—was used for short distance hauling and finish grading.[38]

The dam resembled the other in the basin in its earth fill construction. It featured a steel headgate centered along its length, with the upstream slope covered with a single layer of flat stones and the downstream slope with stone riprap. With a crest length of 680 feet and a height of 13 feet, it was at once the longest and lowest of the Brown Duck Basin structures. The Clements Lake Dam substantially increased the surface area of the lake from 63.9 acres to 80.5 acres and its storage volume to an active capacity of 649 acre feet.[79]

Downstream outlet gate and collar on Clements Lake Dam, the largest and highest of the four Lake Fork River reservoirs. It is the only reservoir constructed by the Dry Gulch Irrigation Company in the Lake Fork drainage.

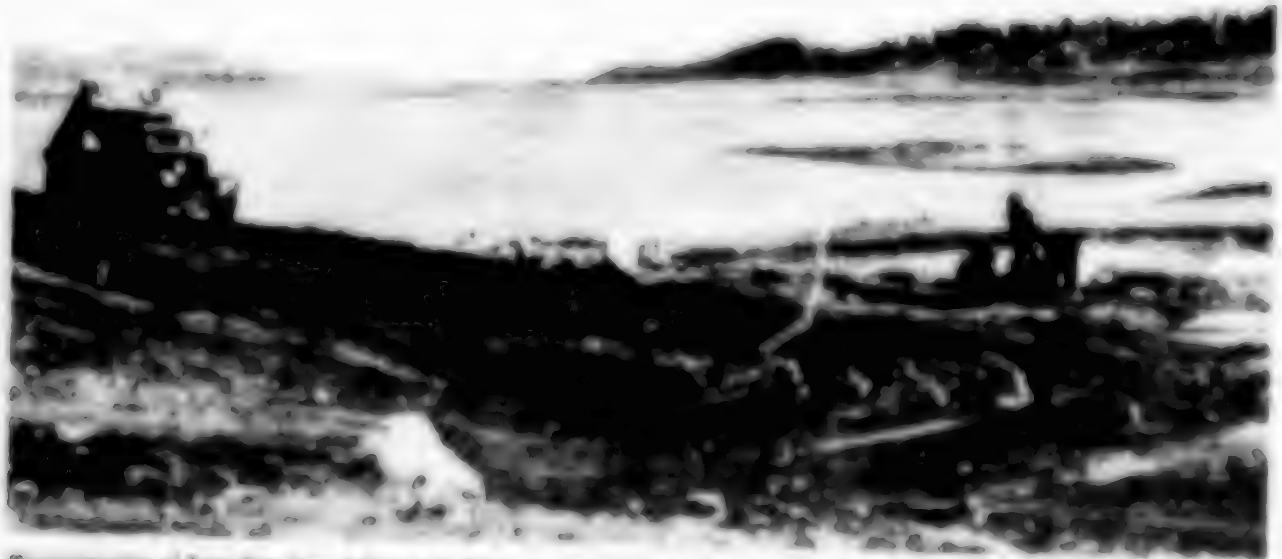
TWIN POTS DAM

The Lake Fork River's water supply in the summer of 1919 proved to be the lowest ever. The early runoff of the Lake Fork in the spring of 1919 was disappointing and the summer runoff was simply non-existent. Again in 1920 the river's flow was meager. Faced with the prospect of another low-water season, the stockholders of the Farnsworth Canal and Reservoir Company approved the construction of Twin Pots Reservoir. The reservoir site, located on the west bank of Moon Lake at an elevation of 7,600 feet, was situated in a large grassy natural bowl. Farnsworth purchased the land for the reservoir from the BIA, and the Utah State Engineer approved filings to store the Lake Fork's waters. Farnsworth contracted with Austin G. Burton, a shareholder in the company, to engineer a dam which would impound water in the two natural depressions. Completed in 1921, the dam was financed by assessments charged against shareholders. The structure was constructed of dirt fill with sorted rock.[80]

Twin Pots Reservoir augmented Farnsworth's low-water flow through the drought years of the early 1920s, but the dam failed in 1927. Fred Lindsay recalls riding to the dam on horseback on the Sunday before Thanksgiving and observing that the impounded water was running over the lip of the dam.[illegible] The dam burst on Thanksgiving Day.

Apparently, the dam's porous core caused the failure. Like all such retention structures, Twin Pots raised the height of the water on the upstream side, creating a greater hydrostatic pressure above the dam than below it. The original earth-fill dam was porous, and as a result of water pressure, some water was lost by seepage. The initial flow carried fine fill particles with it, making the dam a little more porous—and the water flow a bit faster—and in turn moving larger particles.[illegible] This process, coupled with the increased pressure exerted by a larger than normal volume of impounded water, allowed the water seepage to move rapidly enough through the dam to remove progressively larger soil particles, and ultimately fail.

Given the records of other irrigation dams in the West, the collapse of the Twin Pots dam was unusual but not wholly unexpected. Although the technology appeared rudimentary, earthen dam construction, even on a small scale, followed basic hydrological precepts. Dam builders who ignored or overlooked these principles risked extensive seepage and minor washouts or, in extreme cases, complete failure and subsequent flooding. Earthen dams failed periodically throughout the region, and some dams collapsed repeatedly.



Reconstruction of Twin Pots Dam followed its failure on Thanksgiving Day, 1927. Its collapse was the most serious dam failure reported in the Uinta Basin. (Photograph courtesy of Moon Lake Water Users Association, Roosevelt, Utah, ca. 1931.)

The Hatchtown Dam, 220 miles south of Salt Lake City on the upper Sevier River, provided one of the more dramatic examples of these early failures. Originally built in 1900 by a private irrigation company, the Hatchtown Dam was one of the State's oldest. The first dam failed after only one year, was reconstructed in 1901, failed in 1906, and was rebuilt again in 1908. This third earthen structure exhibited minor water seepage beneath its downstream toe for some time. On the afternoon of May 25, 1914, the dam watchmen noticed that the seepage had increased, and several small rivulets formed at the base of the dam. Large sections of the downstream face soon began to spall from the structure's surface. That night, a 140-foot wide breach opened, releasing some 500 million cubic feet of water in a 53-foot-high wall which thundered down the Sevier River Valley. Fortunately, Piute Reservoir, located 46 miles downstream, contained the flood the next day. Officials estimated damage to the dam and to croplands downstream at between $200,000 and $300,000.[43]

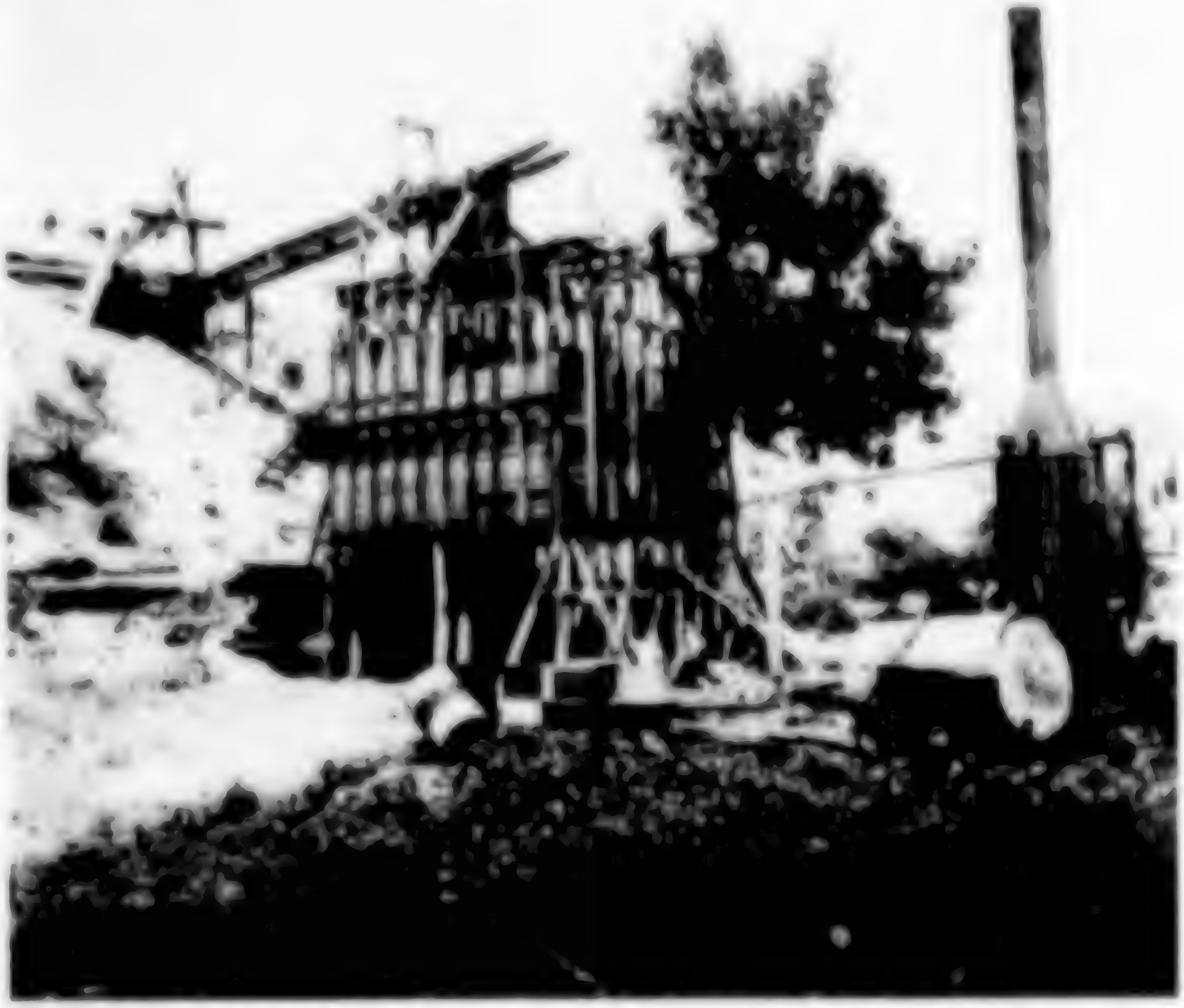
The Hatchtown Dam was not, of course, the only earthen structure to have broken during the period. Newspapers and engineering journals reported similar incidents across the region, with new failures each spring. On January 28, 1914, one of the largest earthen dams in the West, the Horse Creek Dam (1912) in Colorado, broke.[44] Six months later a large part of the face of the Standley Lake Dam (1911) near Denver sloughed into the water, causing its partial failure.[45] The Lyman Dam (1913) across the main channel of the Little Colorado River in Arizona broke on April 14, 1915.[46] And on March 24, 1918, the Calaveras Dam (1915) in California partially collapsed.[47] Like these large-scale dams, many other smaller structures throughout the West also failed. The relatively short lifespans of these structures reflect their fundamental design flaws which began weakening the dams almost immediately.

Undoubtedly the largest earthen dam failure in Utah during the period involved the Mammoth Dam. On June 24, 1917, the immense structure breached, sending a wall of water down the valley and creating extensive downstream damage to the tracks of the Rio Grande railroad, several coal mines, and settlements. Only 3 years earlier, the State engineer had praised the Mammoth Dam as the best of its kind in Utah. A later investigation, however, revealed shoddy initial construction, makeshift subsequent repairs and additions, and careless operation.[48] In an uncharacteristically harsh editorial, the *Engineering News-Record* concluded that the failure of the Mammoth Dam "rests in the final analysis upon the State of Utah." The periodical blamed the State legislature and the State engineer's office "for either the law was faulty in its provisions for enforcement of the rules it laid down, or else the administrative arm of the state has woefully failed to see that the law was lived up to."[49] Salt Lake City engineer H.S. Kleinschmidt agreed and noted that, "Utah is by no means the only state where such accidents have happened or are likely to happen at any moment."[50]

The collapse of the Twin Pots Dam—the most serious dam failure reported among the Uinta Basin structures—was minor in scale in comparison to these other disasters. The apparent stability of the other dams in the Basin was due probably more to their relatively small size than to any superiority in engineering and construction.

In the fall of 1930, Farnsworth secured a loan and began the reconstruction of Twin Pots under the supervision of Nile Hughel, a civil engineer.[51] The Twin Post Reservoir application (No. 8533), filed by the company in 1930 and approved by the State engineer, called for a dam with an 8-foot wide center, clay core wall, and a 36-inch concrete valve stem shaft.[52] The dam's rock-faced slope was 2:1 on the lake front face and 4:1 on the downstream face. Fred Lindsay, who worked for engineer Hughel in the spring of 1931, recalled the grueling sequence for demolition and reconstruction. Lindsay and another worker first tested "the sand on the site down about 30 inches [bedrock] with a 6-inch auger." The two men then placed the "piles of sand where he [Lindsay] could inspect them." The team then breached a 12-foot center section of the existing dam using a fresno scraper. The workers filled the break with clay excavated from a nearby deposit. "We hauled the clay to the dam on dump boards behind a team," Lindsay continued, "and then packed it down with a horse-drawn cement roller." Finally, the contractor removed rocks from the Farnsworth Canal to face the dam, "rolling them right into place."[illegible] The men completed construction of the dam in the fall of 1931; total cost, about $40,000.[illegible]

Similar to the dams built in the Brown Duck Basin, the reconstructed Twin Pots Dam is a typical clay core/earth fill dam—one in which an almost watertight layer was created within the center of a massive dam. Using the prevailing engineering, workers excavated below grade at the dam location and dumped and compacted a clay core in order to diminish water flow through the structure. The core was protected and held in place by tons of earthfill dumped on both upstream and downstream faces, which itself was protected from surface erosion by a facing of stone riprap. The underlying core was seldom totally impervious, but it was sufficiently resistant to water flow to slow the water to a velocity that it no longer carried soil particles as it passed through the dam.[illegible] Engineers and dam inspectors could observe the water emerging below the dam to determine the effectiveness of the core: if cloudy, soil particles were being carried in it and the dam was structurally compromised; if clear, the dam was functioning as designed.



Reconstruction work at Twin Pots Dam. The original dam was the first successful attempt to impound running water and create man-made reservoir. (Photograph courtesy of Moon Lake Water Users Association, Roosevelt, Utah, ca. 1931.)

The reconstructed clay core earthfill dam at Twin Pots Reservoir is still subject to minor leaking but remains structurally sound. Its failure in 1927 seriously affected the farm community of Mountain Home.

Twin Pots Reservoir is fed by the main canal of the company, and the value of the stored water is obtained by releasing the water from the reservoir into the Lake Fork River and taking lieu water through the Farnsworth Canal at a higher point on the stream.[16] Twin Pots Reservoir materially improved the condition of farmers served by Farnsworth Canal. According to Lindsay, "things got tough" after the first Twin Pots Dam failed in 1927. "The drouth [sic] hit hard and we derived little from our high-water rights," Lindsay later explained. "We had to utilize crops for our own use and tighten our belts to make it through the winter." As a consequence, the population of Mountain Home dropped to about 115 families.[17]

Today, water stored in Twin Pots Reservoir supplements the company's secondary water rights and enables farmers under the Farnsworth Canal to raise more grain and hay for livestock which includes dairy and beef cattle, sheep and hogs. Although some orchards were planted, they are not currently producing fruit.[18] Still subject to minor seepage, the Twin Pots Dam remains in place in a structurally sound condition.

SWIFT CREEK AND YELLOWSTONE RIVER DRAINAGE DAMS

During the 1910s and 1920s, the Farmers Irrigation Company applied for storage rights to five natural lakes along the Swift Creek drainage, an east fork tributary of the Yellowstone River. Compared with the Farnsworth Canal and Reservoir Company and the gargantuan Dry Gulch Irrigation Company, the Farmers Irrigation Company was a small concern which irrigated a relatively small farm acreage. And unlike the reservoirs created by Farnsworth and Dry Gulch in the Brown Duck Basin, the lakes controlled by Farmers were marginal, containing as little as 77 acre feet of active storage.

The Farmers Company created its first reservoir on Water Lily Lake. Located at the head of a small creek at an altitude of approximately 960 feet, Water Lily Lake was the lowest of the impounded lakes in the Swift Creek drainage. Its outlet tumbled down 1,300 feet of descent to Swift Creek about ½ mile north of its confluence with the Yellowstone River. On January 25, 1918, the irrigation company filed for irrigation water storage rights totaling 723 acre feet from Water Lily Lake. Although the State engineer approved the permit the following April, the Forest Service had already granted a special use permit to construct the dam in November 1918. By 1920, the company had completed the small-scale dam over the outlet at the south point of the lake. Only 64 feet long and 10 feet high, the Water Lily Lake Dam featured typical earth fill construction with stone riprapping on its upstream and downstream slopes. Fed by an extremely small drainage area, Water Lily was limited in its storage capacity and never did contribute a great deal to the company's low-water augmentation.[33]

The high-country lakes in the Swift Creek Basin required more evaluation by the Forest Service before approval. On October 10, 1917, representatives of the Farmers Irrigation Company applied for 803 acre feet of water from Farmers Lake. The application was approved by the Utah State engineer on April 3, 1918, but Forest Ranger H.O. Van Tassel could not examine the 73-acre lake, the largest in the Swift Creek drainage group, until the snows melted. He recommended that the Forest Service approve the application "becuse [sic] it is essential to the development of homes for three or four families interested near Altonah and will be the only means they will have of getting in low water seson [sic]."[34]

Upstream face of Water Lily Lake Dam shows upright (inoperable) outlet gate. Water Lily is the smallest of the dams in the Upalco Unit as well as the oldest man-made structure to reservoir a natural lake in the Swift Creek drainage.

The Forest Service agreed and granted a special use permit to Farmers Irrigation Company on September 15, 1919, to impound water on Farmers Lake. The permit carried the standard stipulation that work on the impoundment structure was to be completed in one year. If the intended use for the water from the lake was typical, the method of impoundment used by the irrigation company was not. Rather than build the standard earth-fill dam, Farmers blasted a tunnel through the rock of the terminal moraine on the southeast corner of the lake. Approximately 300 feet long and 3 feet wide, the tunnel lowered the natural lake level by 12.5 feet. As per the permit, the shaft was completed in 1920.[61]

Tunnel intake with log trash rack at Farmers Lake Tunnel. Instead of the typical earth-fill dam, a 300-foot-long tunnel was drilled through the rock of the terminal moraine which lowered the natural lake level by 12.5 feet.

On June 25, 1925, and September 4, 1926, the Forest Service issued special use permits for Farmers Irrigation Company for "constructing and maintaining a dam and storing water for irrigation purposes" in Deer Lake and White Miller Lake, respectively.[62] These were the third and fourth lakes in the Swift Creek drainage to be dammed by the Farmers Company. A small—approximately 8 acres—but relatively deep lake, Deer was limited to littoral area because of its narrow confines between two ridges. The lake received water from both White Miller and Farmers Lake and acted as a regulating reservoir for the two other reservoirs. The 140-foot-long, 18-foot-high dam was an earth-fill structure, with stone riprap on both the sloped upstream and downstream faces. It was drained by a 30-inch-diameter gated steel pipe, with a timber weir for an overflow spillway. The dam on Deer Lake increased the surface area of the lake to 11 acres and the maximum active capacity to 249 acre-feet, with a 14-foot maximum vertical drawdown.[63]

Upright outlet gate wheel, stem, and stem guide at Deer Lake Dam. The small but deep lake acts as a regulating reservoir for White Miller and Farmers Lakes.

White Miller Lake was a small, shallow body of water which received its flow from Farmers Lake. The irrigation company built a 105-foot dam consisting of stacked fieldstones and sod, with a cribbed log outlet weir, across from the natural outlet on the south point of the lake. Only 3 feet high, it was the least substantial among those in the Uinta Basin. The small dam increased the lake's surface area minimally and impounded only 77 acre feet of water, with a maximum drawdown of 1.7 feet.[illegible]

In addition to its Swift Creek holdings, the Farmers Irrigation Company actively pursued storage rights on the natural lakes of the Yellowstone River drainage, particularly in the Garfield Basin region west of Yellowstone Creek. On July 21, 1926, the Forest Service granted special use permits to the irrigation company for both Bluebell and Drift Lakes, two small moraine lakes at the base of 12,707-foot Stone Mountain. Farmers constructed a dam on Drift Lake in 1928 and one on Bluebell in 1930.

On February 2, 1927, special use permits were issued to Farmers for the purpose of water storage on Superior and Five Point Lakes.[illegible] Located at an elevation of 11,160 feet, Superior was the higher of the two. It was composed of two shallow bodies of water in its natural state, with an outlet stream flowing east. In 1930 the irrigation company built a 235-foot earth-fill dam along the southern edge which effectively doubled the lake's surface area and diverted its outlet flow into Five Point Lake.[illegible] On Five Point Lake, the company built two dams, a long V-shaped primary structure with a steel pipe outlet and a much smaller secondary dike in 1929. The dams were typically earth-fill with sloped and riprapped faces. The overflow spillway was a natural rock saddle 300 feet south of the main outlet, with a concrete crest poured to minimize erosion. With a surface area of 82.6 acres, Five Point Lake was the largest reservoir in the Yellowstone Basin, and with an aggregate length of almost 1,000 feet, the two retention structures were the longest.[47]

Rock lined spillway of Drift Lake Dam, a high mountain lake in the Yellowstone River drainage.

In marked contrast with the relatively well organized and professionally staffed irrigation companies stood Chester Hartman. On August 8, 1931, local farmers Chester Hartman, George Rogers, and S.K. Daniels filed an application for a special use permit to store irrigation water on Milk Lake. An isolated body of water high on the Yellowstone River drainage, Milk Lake was situated in a glacial cirque on the west side of the divide that separates the Yellowstone from the Swift Creek drainage. Because it was located in the newly established High Uinta Primitive Area, the lake had not been surveyed by the Forest Service for reservoir purposes. Forest Service rangers initially withheld the permit. Undaunted, Hartman proceeded with construction of a dam on the southwest bank of the lake, despite warnings by Forest Service Supervisor A.L. Taylor regarding the unauthorized use.[48]

Forest Ranger Clyde Lambert, in his "Report for Special Use Permit, 8/24/31," recommended that Hartman's application be approved. A subsequent forest ranger's report indicated in December 1933, that Hartman and others had spent $800 on dam construction during the past season and that the structure was about half completed. The ranger concluded, "So far this looks to be one of the best projects in the District."[99] The dam that Hartman was building on Milk Lake differed from the engineered earth fill structures built by the irrigation companies in the 1920s in that it was neither engineered nor earth fill. Hartman's dam was a grouted masonry structure, 218 feet long and 12 feet high, with a sloped and riprapped downstream face and a grated steel pipe outlet. The granite fieldstones on the vertical upstream wall were fitted and laid with Portland cement joinery. Situated picturesquely on the western tip of the lake at the base of a steep mountainside, it was perhaps the most visually striking of the Uinta Basin dams.

Chester Hartman finally received a special use permit to store water at Milk Lake on July 8, 1937, 2 years after he had completed his dam. The Forest Service issued a second permit on November 17, 1938.[100] The Milk Lake Dam began to leak in 1939 and burst in 1940. The breach repaired, Hartman continued its use in subsequent years, while waging a continuing battle with Forest Service representatives over the following decades. The Milk Lake Dam Stands today as a representative of the dam builder's simple craftsmanship.

Upstream face of Five Point Lake Dam. This picturesque reservoir was formed by two dams: a long V-shaped primary structure and a smaller secondary dike.

Downstream face of Milk Lake Dam, the only grouted stone masonry dam in the Upalco Unit.

By 1931, the Indian Irrigation Service had renewed its interest in high country storage reservoirs. During the winter of 1930-31, the snowfall in the Uinta Mountains was unusually light. With below-normal spring rains the irrigation season opened with a marked shortage of water in the streams approaching the extreme drought levels of 1919. B.O. Colton, Jr., the water commissioner for the U.S. Indian Service and Associated Water Users of Lake Fork and Uinta Rivers, advocated the construction of additional mountain reservoirs. "The benefits received from storage facilities already provided," he stated, "as well as the shortage of water during the season, serves to strongly emphasize the need of additional storage development."[illegible]

That year, at the suggestion of Uintah Irrigation Project Supervising Engineer L.M. Holt, Assistant Engineer W.F. Gettleman inspected and surveyed the high mountain reservoirs. Gettleman investigated the construction activities of the five companies and associations of individuals who had built the storage works located on high country lakes in the Uinta, Whiterocks, and Lake Fork River drainages. Of the 24 lakes which served as reservoirs in 1931, six were on the Uinta River and regulated by the Dry Gulch Irrigation Company. Four lakes were situated on the Whiterocks River and maintained by the Whiterocks Irrigation Company. The remaining 14 lakes were located on the Lake Fork drainage system and, as previously described, were regulated by either the Farnsworth, Dry Gulch, or Farmers Irrigation Companies, or by Brigham Timothy and Chester Hartman, *et al.*

The survey attempted to ascertain whether the primary water rights of the Indians had been infringed upon by the damming of the lakes located at the headwaters of the watersheds. The Indian Irrigation Service worried that retention structures which impounded surplus water would prevent the natural storage waters from following their historical course down the tributaries to the main streams. Preliminary findings indicated that in cases where the private companies depleted the natural lake storage by cutting channels or dredging the outlet bed, the runoff and percolation were materially diminished. The irrigation companies tried to compensate for the perceived water right loss by maintaining the level of the reservoir above the normal level of the original lake. However, the effect was similar because the natural springs tended to diminish.[72]

In all instances, the construction of a dam reduced seepage. This made it necessary to let the natural storage into the outlet below by means of gates or other drainage mechanisms. Irrigation companies usually released the stored water during periods of diminished stream flow. The sudden release of this water deprived the lands within the Uintah Irrigation Project of the benefits of gradual discharge of water through surface channels, percolation, and subterranian flow.[73]

There was no question about the Indian water rights on the Lake Fork drainage. In 1923 a Federal court decree forbade the private irrigation companies from interfering with the natural stream flow on the rivers on which the Ute and Uintah Indians held prior rights.[74] While an order by the court provided guidelines for the operation of the reservoirs, many of the regulations were impossible to carry out or enforce as the lakes were difficult to reach and beyond the lines of direct communication.

The irrigation companies received delivery of the stored water through the same rivers—and in some cases the same canals—from which the Uintah Irrigation Project obtained its water supply. In the past, the Indian Irrigation Service relied on a variety of sources for quantity estimates of water stored in these privately built reservoirs. The results were unsatisfactory, lacking uniformity, accuracy, and essential information. Gettleman's water supply survey, therefore, attempted to obtain accurate information as to the exact storage capacity and regulating mechanisms of the high country reservoirs.

Gettleman's party conducted topographic surveys of the lakes using transit and stadia. They tied the traverses into prominent objects—the gate stem at the dam, for example—or by using some prominent natural feature as a foresight. Where existing benchmarks could be found, they were used as the basis for elevation. In lieu of benchmarks, the water level of the lake at the time of the survey was used as a base elevation of 100.0 feet. In all cases, Gettleman tied the measuring guage or board into the elevation of a prominent benchmark placed near the dam or upon it. Sufficient stadia shots of the topography were recorded to show the reservoir capacity with reasonable accuracy to the height of the dam and to such additional height as the dam might be raised in the future. The team shot sufficient elevations to illustrate the elevation and location of tunnels, spillways, outlets, etc., and the elevation, location, and type of dam. Where necessary, sketches were made showing the size, location, and condition of rating flumes, weirs, and other water flow measuring devices.[75]

The team surveyed Kidney Lake, the largest and uppermost of the three Farnsworth Canal and Reservoir Company reservoirs in the Brown Duck Basin, on September 25 and 26, 1931. They measured the rock fill dam at 600 feet long and 23.5 feet wide, with a crest width of 14 feet. A benchmark at 123.13 feet—23.13 feet above the reservoir's water level on the survey date—was established by painting a white mark on the north side of the log crib that served as the outlet works. A substantial log crib structure had been built in 1920 as an access mechanism to the vertical gate stem. Two 12-foot wide spillways located at 121.5 feet established the upper limits of the potential storage, while the flowline of a 36-inch-diameter outlet channel located at 99.15 feet effectively lowered the old natural lake level of 108.0 feet by 8 feet. Gettleman estimated the storage capacity at 3,875 acre-feet when the lake was raised to the lip of the spillway. On September 26, Gettleman's party surveyed Island Lake and 2 days later, Brown Duck Lake.[76]

On September 27, the crew surveyed Clements Lake, the fourth reservoir in the Brown Duck Basin. The earth-fill dam at Clements Lake measured 80 feet long and 14 feet high with an 8-foot crest width. The natural water level of 104.0 feet had been lowered 4 feet to the base level by means of a 36-inch diameter corrugated outlet pipe. The crew painted a benchmark elevation of 115.0 feet on top of the gate stem frame. Gettleman graphed the storage capacity to be approximately 650 acre-feet when the water level was raised to the height of the single 11-foot wide spillway.[77]

Earlier in September, the Gettleman survey party had reached Farmers Lake—the largest of the four impounded lakes in the Swift Creek drainage—which lies in a glacial cirque against the base of the highest Uinta Mountain peaks. Here they surveyed the 300-foot long drainage tunnel built to lower the lake's level. Gettleman estimated the maximum storage capacity of Farmers Reservoir as approximately 680 acre-feet. A benchmark to 115.58 feet was established on a rock located on the west side of the cut above the tunnel, and the date, water elevation, and "U.S.I.I.S." painted in black upon its surface.[78]

Gettleman's survey party observed the remainder of the lakes in the Swift Creek and Yellowstone River drainages in September. In summary, he found that on nine lakes (Kidney, Island, Clements, Brown Duck, Deer, White Miller, Five Point, Drift, and Bluebell), the irrigation companies had created storage by building dams to raise the natural high water level of the lakes. In addition, the companies had cut drainage channels below the natural lake outlets. East Timothy Lake was dammed by a sod structure. Finally, Water Lily Lake, which had been dammed but was not in active use as a reservoir, had a created storage that equaled the natural storage.

Outlet gate wheel, stem, and stem guide, with log access structure at Bluebell Lake Dam. The dam is representative of small-scale earth-fill construction in the Upalco Unit.

In February 1932 Gettleman completed a special report entitled "Lakes and Reservoirs on the Headwaters of the Uintah, Whiterocks and Lake Fork Rivers, Uintah Project, Utah." In presenting his recommendations, the engineer pointed out that "the natural storage of a large number of lakes has been affected" by the development of reservoirs on the natural streams. He attributed the loss of natural stream flow to the lack of natural seepage from the reservoirs during periods of low water. Gettleman urged that "some method should be arrived at where the Indian lands would receive, in actual water delivery when needed, an amount that is a fair equivalent to what they have been deprived of."[illegible]

Given the past strained relations between Indian and white water users, Gettleman "urged that the settlement of this problem be attempted, if possible, by friendly negotiations to reach an amicable agreement, that the present peaceful relations be preserved."[illegible]

Gettleman's report elicited mixed responses. In the opinion of G.E. Clark, Indian Irrigation Service District Counsel, "an immediate attempt should be made to have these companies release sufficient stored water to adequately compensate the Indian lands for the amount of natural stream flow lost."[illegible] Clark held that the Indian Irrigation Service had no cause to complain about the surplus water stored by the private companies but maintained that suits could be brought against companies that interfered with the natural discharge of the lakes. Citing a contemporary authority on water appropriation rights, Clark maintained that the tributaries of a stream, contributing natural flow and percolation, must be considered as a composite body.[illegible] The lakes on the Lake Fork drainage constituted a source of the drainage system and were adjudicated by the 1923 decrees (Dockets 4427 and 4428), which gave the Uintah Irrigation Project lands first water rights. Therefore, the percolating waters feeding them could not be diminished by subsequent appropriators—i.e., the private irrigation companies.

On the other hand, Gettleman's immediate supervisor, Uintah Irrigation Project Engineer Paul F. Henderson, recommended that no legal action be taken against the reservoir companies for the past lowering of lake levels, "as the amount was small and done with the full knowledge of Project officials."[illegible] He advocated that no future lowering be undertaken unless the companies agreed to an equitable release of stored water to compensate for the loss in normal flow. Furthermore, Henderson maintained the construction of reservoirs benefited the Indian lands more than the small loss of normal flow through the development of non-Indian lands, which he considered were a direct benefit to the Indian lands by virtue of increased valuation. Finally, he recommended the construction by private individuals of additional reservoirs and holding ponds in the mountains which he considered possible with "but little outlay of money, only team work being required and a little hard work."[illegible]

After reading the Gettleman report and Clark's and Henderson's recommendations, Holt inferred that the Indian Irrigation Service had a legal right to the natural storage in the reservoirs developed by the private irrigation companies. While Holt admitted that the exact amount of tapped natural storage and water derived by percolation could not be determined, he estimated the water loss to Indian lands in the Lake Fork Drainage to be as much as 15 second feet. Holt recommended that a conference be arranged between the agency and representatives of private irrigation companies, with the Indian Irrigation Service using the legal rights to natural flow as leverage. Second, he said, filings with the State engineer's office were to be made at once for storage of 3,000 acre-feet in Queant and Cleveland Lakes on the Whiterocks River watershed. Third, the Indian Irrigation Service would file a protest on all applications where natural storage in lakes was involved. Finally, storage charts would be made for all lakes by the water commissioner or some disinterested party to determine the amount of water to be released each season.[illegible]

While the Indian Irrigation Service pursued Holt's first three recommendations, Water Commissioner B.O. Colton assumed the last responsibility in 1932. He was immediately faced with a difficult situation, however, as that season opened with a shortage of water. Although winter snowfall in the mountains was normal and its water content high, the arid soil conditions had continued from the previous year.

Fortunately, the release of water in most of the storage reservoirs had been programmed well in advance.[illegible] Water problems arose again in 1933, as Colton was again selected water commissioner. The scarcity of stream flow in April and May, coupled with a short high water season in the weeks to follow, created a critically inadequate irrigation supply in the Lake Fork drainage. In fact, the supply was insufficient to furnish the duty requirements of the primary users alone for about half of the irrigation system. The secondary users received nothing.

The IIIA responded with a new, more stringent set of water use regulations in December. The irrigation companies felt that a solution lay instead in the construction of another storage facility. After a reconnaissance survey, the Bureau of Reclamation chose Moon Lake, on the Lake Fork River, as the site for the reservoir.

Excavation at Moon Lake Dam. The lake's proximity to an established road allowed workers to utilize more mechanized construction methods such as this pneumatic equipment. (Photograph courtesy of Moon Lake Water Users Association, Roosevelt, Utah, ca. 1935.)

The Newlands, or Reclamation Act of 1902 had authorized the Federal Government to undertake reclamation projects, but prohibited any interference with the water laws of any state. This act related to the control, appropriation, use, and distribution of water used in irrigation.[illegible] To raise the capital for the Moon Lake Project, the interested irrigation companies organized to form the Moon Lake Water Users Association. Each company subscribed to the association for shares comparable to the number of acre-feet required for its use. Of the total of 44,880 acre-feet subscribed, 41,720 were controlled by four irrigation companies which had previously developed 12 of the Lake Fork high mountain reservoirs. The Dry Gulch Irrigation Company subscribed for 29,000 shares, the Farnsworth Canal and Reservoir Company for 7,500 shares, Farmers Irrigation Company for 3,400, and Lake Fork Irrigation Company for 1,520 shares.[89] A dam on the southside of the lake was completed in 1937.

On November 3, 1950, Moon Lake Water Users Association President H.L. Allred obtained a Forest Service special use permit covering 40 acres for the purpose of constructing a dam on East Timothy Lake. East Timothy is one of the highest—11,000 feet—and most northerly situated lakes on the Swift Creek drainage. It is fed from an extensive drainage field involving five other lakes and 2,070 acres of land. Brigham Timothy had increased the lake's storage capacity sometime before 1920 by building a rudimentary 12- by 18-foot sod dam across the outlet. Timothy's water rights had been transferred to the Swift Creed Reservoir Company, which in turn became part of the Moon Lake Water Users

Construction of timber form work for Moon Lake Dam. The dam was built by the Moon Lake Water Users Association, a group of irrigation companies who organized in response to the more stringent water use regulations of the Bureau of Indian Affairs. (Photograph courtesy of Moon Lake Water Users Association, Roosevelt, Utah, ca. 1936.)

Association. In 1951, the irrigation association cut a primitive "cat" road from Jackson Park, through the forest to the lake. Over this, men drove the heavy earth-moving equipment to the dam site for construction of a major new retention structure.[illegible]

The construction crew demolished Timothy's original sod dam and built an elongated S-shaped dike across the lake's natural outlet on its southeast corner.[illegible] The contractors used bull dozers to scoop earth-fill material from both the upstream and downstream toes to build the dam, which impounded both the water of the natural lake and a small volume between the lakeshore and dam. Workers placed riprap on the face of the dam itself, but not on the disturbed ground that remained as part of the dam after removal of upstream and downstream material. Despite the fact that construction of the dam was carried out using motorized heavy equipment, the East Timothy Dam resembles the other dams built in the 1920s and 1930s, illustrating the relatively unsophisticated nature of earth-fill technology.

About this time, the Forest Service began more stringent enforcement of reservoir use regulations. On October 17, 1952, Forest Supervisor William D. Hurst admonished Chester Hartman, the permit holder on Milk Lake, for the poor maintenance of the masonry dam. Hurst's letter described the reservoir to be in "very bad condition with several large holes and a large volume of water passing under the dam."[illegible] Hartman repaired the structure. In 1954 the Forest Service determined that Water Lily Lake had been inactive for several years and warned the permittee, Farmers Irrigation Company, of impending permit revocation due to non-use of the water storage capacity.[illegible]

As the terms "water conservation" and "water storage" became synonymous in the late 1940s and 1950s, the Moon Lake Water Users Association consolidated its stewardship over the Lake Fork reservoirs. On October 14, 1954, the Forest Service transferred special use permits on seven Lake Fork drainage reservoirs to the Moon Lake Water Users Association. In addition to East Timothy, the association now held permits for the storage of irrigation water on Water Lily, Farmers, Deer, White Miller, Superior, Drift, and Clements Lakes. By March 20, 1963, the Moon Lake Water Users Association had additionally acquired the special use permits on Brown Duck, Twin Pots, Island, Kidney, Bluebell, and Five Point Reservoirs.

To accommodate Utah's population boom after World War II, State and Federal agencies sought to manage and to utilize Utah's entitlements, particularly on the Colorado River. Although water management in the arid state had been central to the achievement of social and economic goals since initial settlement, it was now viewed as an integral part of a planned growth strategy. In 1946, the seminal concept for the Central Utah Project was formulated in response to the water conundrum. Ten years later, on April 11, 1956, the project was authorized as part of the Colorado River Storage Project Act.[illegible] One of the goals of this project was to furnish additional water to the population centers and the farming areas of the Wasatch Front by collecting, storing, transporting, and redistributing runoff from the south slope of the Uintah Mountains. The Upalco Unit is one of three components of the Central Utah Project.

Following completion of several Forest Service technical reports in the 1960s, the Bureau of Reclamation adopted a policy which called for eventual stabilization of the 14 Lake Fork lakes and Twin Pots Reservoir. This was influenced by the passage of the Wilderness Act in 1964. With regional recreational use growing, many people argued that wilderness designation would enhance recreation, including hiking, backpacking, snowshoeing, cross-country skiing, and fishing. Historically, the Lake Fork lakes had been known to provide some of the best back-country trout fishing in the Uintas. The late-summer drawdown of the mountain reservoirs for irrigation purposes, however, often created rocky or muddy shorelines which greatly reduced their attractiveness from a recreation standpoint. Separate and distinct groups soon emerged with opposing views on dam stabilization: the preservationists who advocated no repair versus the Moon Lake Water Users Association which wished to repair deteriorated dams and continue their use. While the irrigation needs of the water users were apparent, the continued use of the reservoir lakes would, environmentally speaking, reduce the wilderness character of the area.

To exacerbate matters, Ashley National Forest administrators were concerned about the unsafe conditions of several Upalco Unit dams, which could cause loss of life, property, and resource values in the event of a failure. The East Timothy Lake dam was of primary concern. The borrowing of earth from the upstream and downstream toes of the dam had disturbed the natural seal of the ground. As a result, the large earthen dam was subject to extensive and dangerous seepage, which would eventually lead to structural failure. The Milk Lake Dam—the Forest Service's perennial problem—was another suspect structure. On March 7, 1973, Forest Supervisor A.R. McConkie characterized the Forest Service's past performance in enforcing the terms of the special use permit issued for Milk Lake as "lax rather than lenient."[illegible]

McConkie supported his allegation by pointing out that "the dam hasn't been used for water storage in five years, the need for dam and reservoir appears questionable. Since it appears this area will soon be classed as wilderness, it would be appropriate to see if this dam could be cleaned up and the lake restored to natural condition."[illegible]

Upstream face of East Timothy Lake Dam, the largest dam in the Upalco Unit and the last privately financed dam in the Swift Creek drainage. The original rudimentary sod dam constructed by Brigham Timothy c. 1920 was replaced by the Moon Lake Water Users Association in 1981 by the present extensive earth-fill structure.

The Forest Service officially terminated the special use permit on Milk Lake on April 30, 1973, when McConkie informed Bruce Hartman that no valid permit had existed since March 20, 1962—the year Hartman had made application on his deceased father's permit but failed to comply with the terms of the special use agreement.

Since their completion, the 14 Lake Fork high-country lakes have yielded an aggregate annual storage capacity of 4,600 acre-feet, slightly more than the maximum capacity of Twin Pots Reservoir. Analysis of the impact that these reservoirs had had upon the basin is complicated by the fact that they were not constructed as a homogeneous group, but rather as several small clusters built by different parties. The reservoirs created at the heads of the Swift Creek and Yellowstone River drainages by the Farmers Irrigation Company were small-scale and marginal, at best. Although they may have allowed the company to function viably as an irrigation supplier for several years, in reality they did little to increase the amount of irrigated farmland in the basin. The relatively small amount of information available about the irrigation company indicates the minimal impact that it had on the region. In addition, Farmers Irrigation Company ceased operation as an individual entity sometime after the formation of the Moon Lake Water Users Association. Similarly, the reservoir maintained by the Hartman family provided water for an extremely small area, probably no more than the farms of the three original applicants for the special use permit. As such, its economic impact to the basin has been negligible.

The Dry Gulch Irrigation Company, on the other hand, was by far the largest of the irrigation companies in the basin. Although it is impossible to distinguish the impact of the Clements Lake Dam from the diverse and far-flung irrigation network of the immense company, it seems likely that this reservoir enhanced Dry Gulch's holdings in the Lake Fork drainage area to some extent.

The Farnsworth Canal and Reservoir Company accrued the greatest benefit from the high mountain water storage reservoirs. As a secondary water rights holder under the shadow of the Dry Gulch Irrigation Company, Farnsworth had much to gain from its low-water storage capacity. The company first created active water storage on a viable scale in the Uinta Basin. Unlike the Farmers Company reservoirs, the three Farnsworth lakes in the Brown Duck Basin held substantial volumes of water which could be transferred directly to the headgate of the company's canal. This storage clearly enhanced Farnsworth's economic position in the basin and allowed the company to increase the agricultural acreage it served in the Mountain Home vicinity. This was increased geometrically by the creation of the Twin Pots Reservoir in 1921—the largest storage body built in the basin to that date. At the time of the formation of the Moon Lake Water Users Association, Farnsworth was second—a distant second, to be sure—only to Dry Gulch in pledged shares.

Water storage and handling technology in the early 1900s in Utah and the West ranged from the ingenious and sophisticated, as evidenced by the Mountain Dell Dam, to the primitive, as evidenced by numerous hand-built irrigation ditches and control structures. As relatively simple structures, built for the most part with natural materials using labor-intensive and unsophisticated construction techniques, the 14 high-mountain dams and the Twin Pots Dam in the Upalco Unit tend more toward the latter than the former. Though rudimentary, they nevertheless exemplify two basic types of small-scale dam construction performed at remote locations in the West: the rubble masonry dam and the earth-fill dam.

Though technologically representative, the small dams are more significant for their representation of an historical theme crucial to Western development: water storage and distribution. From the earliest settlement to the present, water has been priceless in the arid West. To the BIA, it was critical for successful cultivation of crops and integral to the eventual assimilation of the Utes. White settlers and church leaders realized that without adequate irrigation water, settlement of the Uinta Basin was impossible. The irrigation systems in the basin grew organically in response to the farmers' needs, beginning with the first short canals, laterals, and branches which intertwined the small agricultural communities. The last aspect of water flow to be controlled by the irrigators, creation of these high mountain reservoirs in the 1920s and 1930s, marked the culmination of early irrigation efforts in the basin. As such, they are an integral part of a historically significant system.

ENDNOTES

[1] Howard E. Metaker, "Recommend Stable Water Levels of Reservoired Lakes in the High Uinta Mountains" (Central Utah Project, 1967), p. 1, U.S. Forest Service Office, Provo, Utah.

[2] Roderick Nash, *Wilderness and the American Mind* (New Haven, Connecticut: Yale University Press, 1982) 3rd ed., p. 171.

[3] Farnsworth Canal and Reservoir Company Minutes, 1912-22, in possession of Fred Lindsay, Secretary, Mountain Home, Utah, p. 177, taken from "The History of Three Mountain Reservoirs," unpublished monograph by Carolyn W. Winterton, p. 2.

[4] Farnsworth Minutes, p. 179.

[5] Ibid., p. 20.

[6] Reservoir Files #5152, #5158, #5159, Ashley National Forest, Roosevelt District Ranger Office (ANFRDRO), Roosevelt, Utah.

[7] Moon Lake Water Users Association Files, Mountain Reservoir Folder, Roosevelt, Utah, taken from "The History of Three Mountain Reservoirs," unpublished monograph by Carolyn W. Winterton, p. 3.

[8] H.R. Leach, "Report on the Results of Storage Investigations Made in the Whiterocks, Uinta, Yellowstone, and Lake Fork Watersheds 1919," prepared for Alfred J. Charles, Project Engineer, Uintah Irrigation Project, 31 December 1919, p. 32, BIA, Irrigation Office Files, Ute and Ouray Agency, Fort Duchesne, Utah.

[9] Ibid., p. 4.

[10] Ibid., p. 4.

[11] Ibid., p. 24.

[12] Ibid.

[13] H.R. Leach, correspondence to A.J. Charles, fall of 1919, p. 2, Irrigation Office Files, BIA, Ute and Ouray Agency, Fort Duchesne, Utah.

[14] H.W Dietz, correspondence to W.M. Reed, Chief Engineer Irrigation, Washington, D.C., Fall of 1919, Irrigation Office Files, BIA, Uintah and Ouray Agency, Fort Duchesne, Utah, p. 2; also in Irrigation Division, Gen. Corres. Files, Box 27, BIA, RG 75, NA.

[15] "Upalco Unit High Mountain Lake Stabilization" (U.S. Bureau of Reclamation Report, 1982), p. 1, Government Documents, Lee Library, Brigham Young University, Provo, Utah.

[16] Reservoir Files #5152, #5159, ANFRDRO, Roosevelt, Utah.

[17] "As Built Plans," Uintah Engineering and Land Surveying, Moon Lake Water Users Association Files, Roosevelt, Utah, taken from "The History of Three Mountain Reservoirs," Unpublished monograph by Carolyn W. Winterton, p. 4, Roosevelt, Utah.

[18] Ibid.

[9] *The Duchesne Record*, 24 March 1917.

[10] *The Duchesne Record*, 5 May 1917.

[11] Personal interview with Fred Lindsay, Secretary, Farnsworth Canal and Reservoir Company, Mountain Home, Utah, by James Jurale, 9 January 1986.

[12] Ibid.

[13] Ibid.

[14] "Preliminary Engineering Report: Stabilization of High Mountain Lakes, Upalco Unit." (U.S. Forest Service Report, 1970), pp. 4, 15, 20, Ashley National Forest Service Office, Provo, Utah.

[15] A.J. Cleary, "The Calaveras Dam, California, the Highest Earth Dam," *Engineering News*, 1 October 1914.

[16] J.C. Wheelon, "A Large Hand-Built Earth Dam, 'Mammoth Reservoir,' Price, Utah," *Engineering News*, 15 October 1914.

[17] Farnsworth Minutes, pp. 292-295.

[18] *The Duchesne Record*, 9-30 June 1917; Farnsworth Minutes, pp. 239-346.

[19] Farnsworth Minutes, pp. 292-295.

[20] Lindsay, personal interview by James Jurale, 9 January 1986.

[21] *The Duchesne Record*, 25 August 1917.

[22] Ibid.

[23] *The Duchesne Record*, 18 August 1917.

[24] Linsday, personal interview by James Jurale, 9 January 1986.

[25] Personal interview with Pete Wall, retired cowboy, Altamont, Utah, by James Jurale, 9 January 1986.

[26] Ibid.

[27] Ibid.

[28] Ibid.

[29] "Preliminary Engineering Report: Stabilization of High Mountain Lakes, Upalco Unit," p. 10.

[30] Lindsay, personal interview by James Jurale, 9 January 1986.

[31] Ibid.

[32] William Layne Woolf, *Autobiography of William L. Woolf*, (privately printed and found at the University of Utah Library, 1979), p. 89.

[43] Guy Sterling, "Failure of the Dam of the Hatchtown Reservoir, Utah," *Engineering News*, 4 June 1914.

[44] M.C. Hinderlider, "Failure of the Horse Creek Earth Dam," *Engineering News*, 16 April 1914.

[45] "Partial Failure of Standley Lake Dam, Near Denver, Colo.," *Engineering News*, 6 August 1914.

[46] W.C. Nichols, "Failure of Lyman Dam, Arizona," *Engineering News*, 10 May 1915.

[47] Allen Hazen and Leonard Metcalf, "Middle Section of the Upstream Side of Calaveras Dam Slips into Reservoir," *Engineering News-Record*, 4 April 1918.

[48] H.S. Kleinschmidt, "Defiance of Statute and Engineering Laws Wrecked Mammoth Dam," *Engineering News-Record*, 12 July 1917.

[49] "Mammoth Dam Failure Due to Lax State Control," *Engineering News-Record*, 12 July 1917.

[50] "As Usual the Innocent Were the Chief Sufferers," *Engineering News-Record*, 12 July 1917.

[51] "Report of Horace W. Sheley, Federal Court Water Commissioner for the Uintah Basin," irrigation season 1930, in possession of Fred Lindsay, Mountain Home, Utah.

[52] "Revised Detail Sheet, Twin Pots Damsite," Farnsworth Canal and Reservoir Company Plan H-165A, Dry Gulch Irrigation Company Files, Roosevelt, Utah.

[53] Lindsay, personal interview by James Jurale, 9 January 1986.

[54] Ibid.

[55] Wooll, *Autobiography*, p. 89.

[56] "Report of Horace W. Sheley."

[57] Lindsay, personal interview by James Jurale, 9 January 1986.

[58] Ibid.

[59] Leach, "Report on the Results of Storage Investigations, 1919," Section on Water Lily Lake.

[60] H.O. Van Tassel, "Forest Service Special Use Report, 1919," dated 15 May 1919, Farmers Lake Reservoir File, ANFRDRO, Roosevelt, Utah.

[61] "Preliminary Engineering Report: Stabilization of High Mountain Lakes, Upalco Unit," n.p.

[62] White Miller Lake Reservoir file (#5163), Deer Lake Reservoir file (#5154), ANFRDRO, Roosevelt, Utah.

[63] "Preliminary Engineering Report," n.p.

[64] Ibid.

[65] Superior Lake file, ANFRDRO, Roosevelt, Utah.

[66] "Preliminary Engineering Report," n.p.

[67] Ibid.

[68] Milk Lake Reservoir file, ANFRDRO, Roosevelt, Utah.

[69] Ibid.

[70] Ibid.

[71] "Report of B.O. Colton, Jr., Water Commissioner for U.S. Indian Irrigation Service and Associated Water Users, Lake Fork and Uintah Rivers, 1931," Miscellaneous files, Uintah Irrigation Project Warehouse, Fort Duchesne, Utah.

[72] Ibid.

[73] Ibid.

[74] Docket No. 4418, United States District Court, Utah, 1923.

[75] William F. Gettleman, "Report on the Lakes and Reservoir on the Headwaters of the Uintah, Whiterocks and Lakefork Rivers, Uintah Project, Utah, Feb. 1932," prepared for Paul F. Henderson, Project Engineer, Uintah Irrigation Project, through L.M. Holt, Supervising Engineer, U.S. Department of the Interior, Indian Field Service, Uintah Irrigation Project, Salt Lake City, Utah, Kidney Lake survey graph, Irrigation Office Files, BIA, Ute and Ouray Agency, Fort Duchesne, Utah.

[76] Ibid., Island and Brown Duck Lakes survey graphs.

[77] Ibid., Clements Lake survey graph.

[78] Ibid., Farmers Lake survey graph.

[79] Gettleman, "Report on the Lakes and Reservoir," Water Supply Investigation Report, Recommendations, pp. 8-9.

[80] Ibid., p. 9.

[81] Gettleman, "Report on the Lakes and Reservoir," G.E. Clark, Introductory Report, p. 6.

[82] *Kinney on Irrigation*, 2nd Ed., Vol. 1, Sec. 311, Vol. 2, Sec. 649.

[83] Ibid., p. 9.

[84] L.M. Holt, Supervisory Engineer, to H.V. Clotts, Assistant Director, U.S. Indian Irrigation Service, 9 April 1932, BIA files, Fort Duchesne, Utah.

[85] "Report of B.O. Colton, Jr., Water Commissioner, 1932," Miscellaneous files, Uintah Irrigation Project Warehouse, Fort Duchesne, Utah, p. 11.

[86] A.L. Walker, "A Study of Economic Conditions of the Uintah Irrigation Project, Utah," Office of Indian Affairs, U.S. Department of the Interior (Washington, D.C., 1938), p. 58.

[87] Ibid.

[88] Ibid.

[89] East Timothy Lake File (#5161). ANFRDRO. Roosevelt, Utah

[90] Ibid.

[91] Milk Lake Reservoir File. ANFRDRO, Roosevelt, Utah

[92] Water Lily Lake File (#5163). ANFRDRO. Roosevelt, Utah

[93] 70 Stat. 105. April 11, 1956

[94] Milk Lake Reservoir File. ANFRDRO. Roosevelt, Utah

[95] Ibid.

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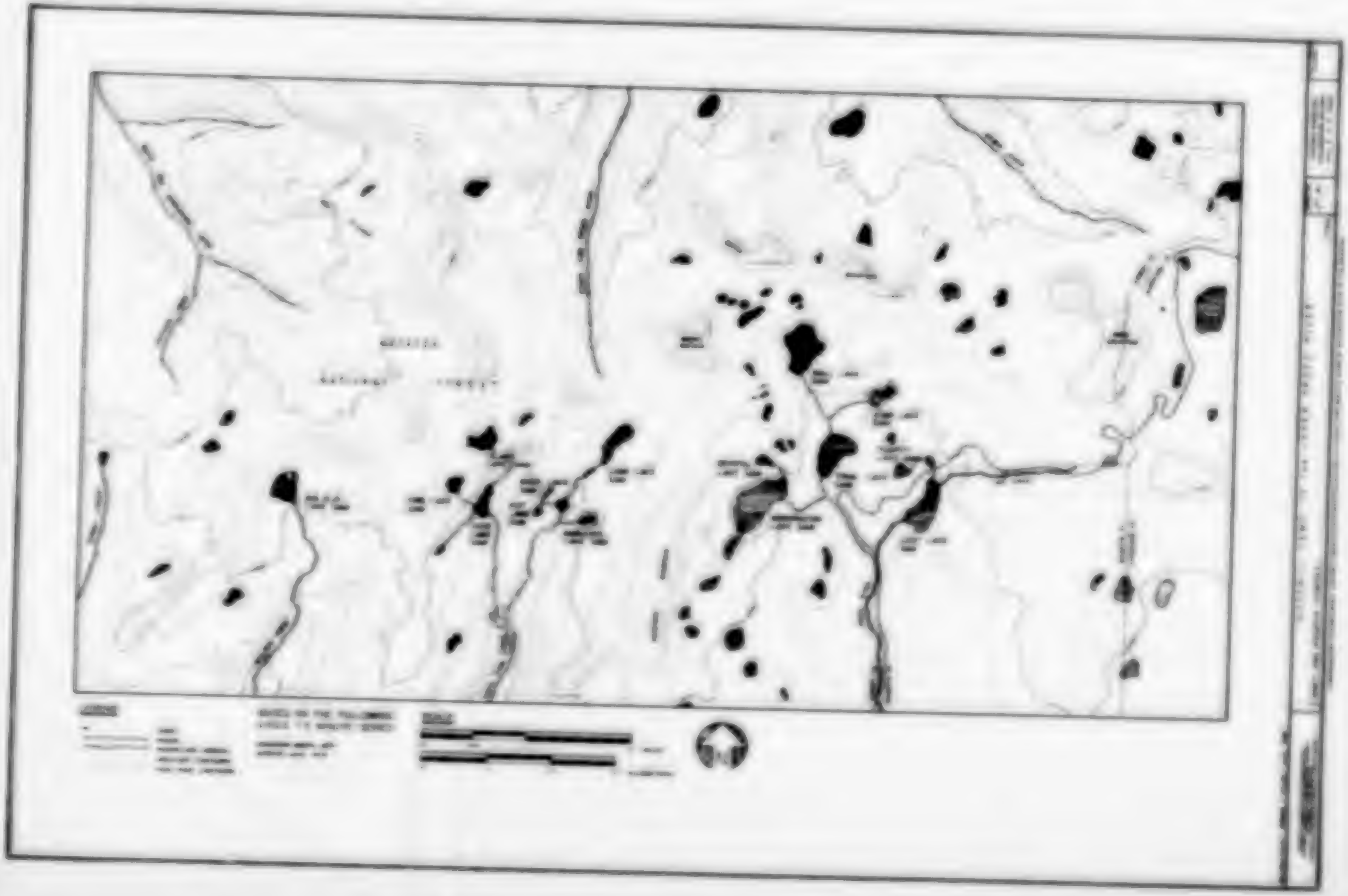
HISTORIC DAMS
OF THE UPPER PROVO RIVER

UTAH SHOWING A PORTION OF THE UINTA MOUNTAINS

SCALE
MILES
KILOMETERS

THE HISTORY OF THE UPPER PROVO RIVER DAMS CAN BE TRACED TO THE FORESIGHT OF JOSEPH R. MURDOCK, A PROMINENT UTAH LEGISLATOR. IN [illegible] MURDOCK, ACTING ON BEHALF OF A NUMBER OF LARGE MORMON-CONTROLLED IRRIGATION COMPANIES, APPLIED TO THE STATE ENGINEER'S OFFICE TO IMPOUND WATER IN NUMEROUS LAKES WITHIN THE [illegible] NATIONAL FOREST. MURDOCK'S GOAL WAS [illegible] THE WESTERN WATER RESOURCES OF THE PROVO RIVER. ALTHOUGH TECHNOLOGICALLY RUDIMENTARY, THESE SMALL EARTH-FILL AND MASONRY DAMS PROVED INSTRUMENTAL IN OPENING THE PROVO BENCH IN [illegible] COUNTY TO [illegible] AND BUILT AS A SYSTEM, THE DAMS REFLECT THE IMPORTANT ROLE IRRIGATION PLAYED IN UTAH'S EARLY 20TH CENTURY SETTLEMENT.

THIS PROJECT WAS UNDERTAKEN BY THE HISTORIC AMERICAN ENGINEERING RECORD (HAER) OF THE NATIONAL PARK SERVICE [illegible] ROCKY MOUNTAIN REGIONAL OFFICE, IN COOPERATION WITH THE UPPER COLORADO REGION, BUREAU OF RECLAMATION, UNDER THE DIRECTION OF HISTORIAN GREGORY D. KENDRICK (NPS). FIELD WORK FOR THIS PROJECT WAS COMPLETED DURING [illegible] BY ROBERT W. RIGHTER, UNIVERSITY OF WYOMING; [illegible], UNIVERSITY OF WYOMING; CLAYTON B. FRASER (LOVELAND, COLORADO) AND HISTORICAL ARCHITECT BONNIE J. HALDA (NPS).



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CHAPTER FOUR

DAMMING THE HEADWATERS OF THE PROVO RIVER

by James A. Jurale and Robert W. Righter

The headwaters of the Provo River originate high on the western slope of the Uinta Mountains at an elevation of about 11,000 feet. Here, rounded peaks tower over glacier-carved basins, which are interspersed among high glacial moraines and drifts. Meadows and coniferous forests occupy the basin floors. The annual precipitation on this face of the range is approximately 40 inches, most of which falls as snow to form the deepest snowpacks in the Uinta Mountains. The melting snow, held in numerous alpine lakes, forms the primary sources of the Provo River.

The Provo River tumbles from the mountains and through the Utah Valley on its way to Utah Lake, a crescent shaped, 130-square-mile body of water. Between the Wasatch Front and the immense lake on the western edge of the valley lies a strip of land about 5 miles wide and 40 miles long which slopes gently to the west. The river penetrates the half-moon rim near the center of Provo Canyon and flows in a southwesterly direction to the freshwater lake. Located between the Wasatch Mountains and Utah Lake, to the southeast of the river, lies Provo: the county seat of Utah County, the home of Brigham Young University and a community whose Mormon culture is predated in Utah only by that of Salt Lake City.

An abundance of vegetation and wildlife characterized the watershed during the Indian occupation of the Provo River drainage. Native cutthroat trout abounded in a clear, clean Utah Lake. The Jordan River, the lake's only natural outlet, meandered some 50 miles to the Great Salt Lake. River otter hunted along the riverbanks, and beaver were abundant. Bighorn sheep, elk, mule deer, bear, wolves, and cougar inhabited the area in winter. Stands of lodgepole pine, sub-alpine pine, Douglas fir, and Engleman spruce provided cover for wildlife on the lower slopes, while a rich supply of cottonwoods, birch, willows, and a variety of shrubs and native grasses grew along the lower valley riverbanks.

Within a very short period of Brigham Young's arrival in the Great Salt Lake Valley, Mormon colonists explored southward from Salt Lake City into Utah Valley. Within a week, one from their group, Orson Pratt, viewed Utah Lake. That December, Parley P. Pratt, Orson Pratt's brother, led a fishing expedition which sailed along the lake. In March 1849, John S. Higbee, who accompanied Pratt on his tour of exploration, was called by Brigham Young to form a settlement on the Provo River in Utah Valley. Some 30 families, numbering nearly 150 persons, set out under Higbee and on April 3, commenced building "Fort Utah."[1] This was the nucleus of Provo City.

From the beginning, Provo's most precious natural resource was its water supply. Although the narrow band of alluvial soil at the base of the Wasatch was fertile, it was the clear water meandering from the mountains which gave it agricultural value. Early accounts indicate that the lower Provo River was a scenic stream, covered on either side with thickets of underbrush interspersed with taller trees which provided suitable timber for construction. Acres of grass growing along the banks provided food for the livestock, and fish were abundant. Parley Pratt wrote to his brother on July 8, 1849, describing the river's fish population: "I saw thousands of fish being caught by hand . . . . I could buy a hundred, which each weigh a pound, for a piece of tobacco as large as my finger. They simply put their hand into the stream, and throw them out as fast as they can pick them up."[2]

Frequent floods compelled newcomers to establish their farms on higher ground, however, necessitating the construction of irrigation canals to carry river water to the crops. In the summer of 1849, James Bean and the Clark family tapped the Provo River and dug the first irrigation ditch, later known as the Bean Ditch.[3] Bean claimed to have grown and harvested the first crop of grain in Utah Valley. In the spring of 1850, the Turner Canal and the East Union Ditch were dug and brought water from the Provo River to newly allocated farmlands.[4]

The success of the Mormon settlers in the Provo River Valley was largely due to their single-minded determination to create a "Kingdom of God" in the wilderness. Although Provo was geographically distinct from Salt Lake City, in political, economic, and religious matters it was only an extension of the Mormon authority centered in Salt Lake City. There, Brigham Young, President and Prophet to the Mormon Church, was the ultimate decision-making authority.[5]

In certain situations, however, Young delegated considerable power to the local leadership. One such area was the allocation of natural resources, particularly land and water. Given the distances and the primitive transportation systems, land and water use questions were thought to be best handled regionally by stake presidents and their councilors, and locally by ward bishops. On March 19, 1851, church leaders formed an ecclesiastic organization in Provo and appointed the settlement's first ward bishop. The Provo Stake was organized soon thereafter. As intermediaries between the wards and the central church leadership, stake leaders played an important role in Provo River water policy.

Historian Leonard Arrington described the goal of pioneer Utah agricultural policy as "expansion and complete self-sufficiency as a minimum. Maximum utilization of local water supplies and community self-sufficiency when practicable."[6] This goal was partially accomplished in Provo City which by 1850 boasted five water-propelled manufacturing establishments—three sawmills, one grist mill, and one shingle machine—but considered agriculture its main industry by necessity.[7] About that time, an attempt was made to facilitate family self-sufficiency by distributing allotments of irrigated land large enough to permit each family, regardless of occupation, to raise its own fruit and vegetables. Soon an extensive network of irrigation canals, laterals, and branches had grown throughout the community to bring water to these family plots. So pervasive was the quest for water that it was found necessary to "notify the owners of plots on the east side of Main street to make their water ditch on the east side of said street as they will not be allowed to take water across main street to irrigate their gardens."[8]

Evidence of the influence of Brigham Young and the church can be seen in the organization of the Provo Canal and Irrigation Company. When the Legislative Assembly passed the law creating the company in January 1853, Governor Brigham Young approved the company organizers' right and privilege "to take out one-half of the waters of the Provo River, at or near the mouth of the canyon."[9] He also took a personal interest in the construction of major Provo River water projects and on more than one occasion declared his intention that the church construct a large canal, bringing Provo River water to Big Cottonwood Creek, and from there to Salt Lake City.[10]

The amount of water that could be diverted from the Provo River was at first considered unlimited. As Utah Valley's population grew, however, latecomers challenged the right claimed by the early settlers to use as much water as they desired. Accordingly, the value of Provo River water increased as the population increased. Population pressure also triggered further water regulation and increased the number of irrigation disputes. The Mormon Church served as a supervisor and arbitrator in these controversies.

In 1856, Provo Mayor Benjamin Bullock demonstrated the tenuous distinction between church and state when he called on the church wards to help prevent the Provo River from flooding, stating that the members' labor would be credited toward taxes.[11] That same year, the volatile Bishop Elias Hicks Blackburn of Provo directed his brethren to begin repairing the town's water ditches. He warned that if anyone neglected his duties, he would be "removed to some remote settlement where water is scarce."[12]

Latter-day Saint Church leaders clearly preferred an ecclesiastical solution to any water dispute. Even as late as 1878, Bishop William McCullough of the Utah Stake (reorganized Provo Stake, 1877) of

Zion stated, "[We] should do all we can to avoid going to Law over disputes on the water question . . . ."[11] John E. Booth, also of the Provo based stake, supported McCullough stating, "The settlement of water difficulties [should be by] the judgement of the Priesthood as the courts were not thoroughly versed in the justice of the cases relating to water as were the old settlers of the county."[12]

During the first 2 decades of Provo's settlement, centralized control and communal ownership of Provo River water functioned well as long as the supply was sufficient to meet the needs of a relatively small population. With the completion of the transcontinental railroad in 1869, however, the population of the entire Utah Territory increased markedly. Although the majority of new immigrants in the Utah Valley were at least nominally members of the Mormon Church, the demand on the Provo River's limited water resources produced friction among Mormon water users. The first serious controversy concerning Provo River water occurred in 1884. A tentative agreement was reached by the various canal companies that drew water from the river, in which the city of Provo was given four-tenths of the stream. The agreement did not prove satisfactory, and in 1894, Provo began a suit against the canal companies to have the water rights adjudicated. This case, however, was never brought to trial. The appearance of new water users and the appropriation of a number of springs in Provo City necessitated further litigation in 1902 and 1907 which adjudicated Provo River water, dividing its flow into two classes, "A" and "B" respectively, based on volume.[13]

However, well before this litigation, irrigation companies had acted to increase water supply by attempting to dam both Trial and Washington Lakes in the Uinta Mountains. In August 1889 the Wasatch Canal Company revealed a plan to develop untapped water by building dams on natural lakes in the Uintas. The Wasatch Irrigation Company invited the Charleston Irrigation Company and the Midway Irrigation Company to join the project. Eventually, it was agreed that Wasatch would receive one-half of the water, while Charleston and Midway would be entitled to one-sixth each for their respective investments. The remaining one-sixth would be divided among other interested parties.

Upstream face of Trial Lake Dam. The dam was technologically notable for having a concrete core. The present 1914 dam followed an 1899 failed attempt to dam Trial Lake.

To oversee construction and distribute water, the participating companies and individuals formed the Provo Valley Reservoir and Irrigation Company. Newly elected company officers quickly formulated plans to construct reservoirs in the fall of 1889 on Trial and Washington Lakes. The irrigation company employed Edward Buys as chief engineer for $4.00 per day. Wooden headgates and pipes were placed at the base of the natural lakes, and then the lakes were substantially enlarged through the placement of earth on top of the lake's natural banks. The cost of this enterprise was some $800, plus the time of eight teams of horses and 24 men.

As it turned out, it was not money well spent. The following spring the two partially completed dams were washed out, causing some flooding and loss of equipment. Discouraged and broke, the Heber Valley farmers abandoned the idea of a reservoir to a later time when engineering skill and financial backing would promise greater success.[19]

Shareholders of the Washington Irrigation Company would be the next group to attempt to create high mountain water storage in the area. Incorporated in 1906 with Donald C. Pack as president and Bryan Mitchell as secretary, Washington applied for a right-of-way to store water on Big Elk Lake on October 22, 1906. As the Uinta National Forest Reserve (Utah's first) had been in existence for only 9 years in 1906, and storage dam construction was essentially a 20th-century phenomenon, no special use permits had, as yet, been issued. The Forest Reserve Supervisor, in accordance with the amendatory regulations of the U.S. Department of Interior approved by the Secretary of the Interior on April 25, 1906, concerning rights-of-way for railroads, canals, and reservoirs, approved the company's request

Downstream face and toe of Big Elk Lake Dam, the first U.S. Forest Service approved reservoir in the upper Provo River drainage.

after Pack signed a "stipulation." The regulations provided that "whenever a right of way is located upon a forest or timber-land Reserve, the applicant must enter into such stipulation and execute such bond as the Secretary of Agriculture may require for the protection of such Reserve."[17]

This was the first such right-of-way granted for a reservoir in the Uinta Forest Preserve. In compliance with the requirments for protection of the preserve, the Washington Irrigation Company agreed to "maintain the waters of Reservoir No. 1 (known as Big Elk Lake) at or above the normal level of the lake."[18]

In 1909 Joseph R. Murdock and a number of associates organized the Provo Reservoir Company, and under the amended water laws of the State (1903), made application to appropriate a portion of the unappropriated waters of the Provo River. The company held that a great quantity of water flowed through canals and ditches into Utah Lake. This water was not used for irrigation purposes and was, therefore, subject to appropriation. Provo City and the majority of established irrigation companies would not accept this point of view and refused to arbitrate the matter. In response, the Provo Reservoir Company filed suit in the Fourth District Court against "all other water users on Provo River."[19] The matter finally came to trial before Judge C.W. Morse in June 1916, but because the suit was so stubbornly contested, so many interests were involved, and so many measurements had to be taken, the final decree was not handed down until May 2, 1921. The final decree awarded a substantial amount of the Provo River water to the Provo Irrigation Company.

In the interim, Joseph R. Murdock, president of the Provo Reservoir Company and Director of the Timpanogos Irrigation Company, was active in consolidating his company's control on the region. Joseph R. Murdock and the nine other individuals who served as the officers or sat on the board of directors of the Provo Reservoir Company were prominent professional men and all members of the Mormon Church. In 1901, Murdock was "called" by the church to act as first councilor to William H. Smart, president of the Wasatch Stake. In 1905 he succeeded Smart as president of the Wasatch Development Company, which functioned as the corporation for promotion and development of church homesteading in the Uinta Basin. Following the incorporation of the Provo Reservoir Company on July 5, 1910, Murdock served concurrently as its president, as director of the Timpanogos Irrigation Company, as president of the Provo Water Users Association, and as construction manager for the Union Reservoir Company.[20]

His son, Royal Joseph Murdock, who acted as secretary of the Provo Reservoir Company, had just recently returned from a "mission" to the northern states and was destined to become a bishop of the Provo 4th Ward, Utah Stake.[21] Joseph B. Keeler, vice president of the Provo Reservoir Company was a Mormon bishop and author. He served as an early stake president following the redesignation of the Provo Stake to the Utah Stake in 1877.[22]

Members serving on the Provo Reservoir Company's board of directors represented a cross-section of Utah's power elite. They were: Jesse William Knight, son of the investment magnate, financier and first councilor of the Utah Stake presidency; Stephen L. Chipman, a member of the Provo school board and city council, and second councilor in the church; Edward D. Clyde, graduate of Brigham Young Academy, prominent orator and second councilor to the presidency of the Wasatch Stake; George H. Brimhall, president of Brigham Young University; Abel J. Evans, high councilor in the Utah Stake, four-time state senator and self-educated attorney; David A. Broadbent, bishops' councilor and principal of Heber schools; and Earl J. Glade, professor of business at Brigham Young University, Utah's radio pioneer and church elder.[23]

The executive and director positions of the Wasatch, Timpanogos, and Sego Irrigation Companies were, likewise, filled exclusively by prominent Mormons. Elder James Clover, president of the Sego Irrigation Company, had been one of the first missionaries sent to Scandanavia from Utah.[24] The vice president of the Timpanogos Irrigation Company, James Herbet, was a member of the Willie Handcart Company of 1856.[illegible] It appears that from early on, a select Mormon Church membership held absolute control on high-country storage rights on the upper Provo River.

Murdock realized early that, with water crucial to farming, downstream users would soon think not only of diversion of streams but of storing the waters at or near their sources. Mountain runoff that would otherwise flow through the basin could be impounded in reservoirs during the abundant weeks of May and early June and released during the dry period in July and August, when irrigation demands were highest. Further, new reservoirs would not have to be constructed in the Uintas, when several natural high-country lakes would be altered by damming to increase their holding capacities and control the outlet flow. On November 23, 1909, Murdock applied with the state engineer's office for impounded water in 23 lakes located in the Uinta Forest Reserve at the headwaters of the Provo River.[illegible] Murdock's move was a masterful stroke, all but monopolizing the western slope water sources for the Provo River.

Concrete spillway with freeboards removed and remnants of log trash rack on Wall Lake Dam. The dam was built by the Provo Reservoir Company using crews of farmers from the Heber Valley.

On June 20, 1910, Murdock, acting in behalf of the Provo Reservior Company, and Timpanogos Irrigation Company, applied for permission to construct reservoirs within the Uinta Forest Reserve on three of the larger lakes: Washington, Trial, and Wall. Murdock also requested the privilege to "to use rock, earth and timber as may be necessary for cabins, road building, bridges and construction work of dams." The dams were to be constructed of earth, rock, and cement. The following day, Acting Supervisor J. Carl Allred gave the Provo Reservoir Company permission to begin construction as soon as a special use permit was received from the forest officer. Allred himself approved a special use agreement executed with the company on July 6, 1910, but it was canceled.[17]

Allred's approval, however, seemed enough to prompt the Provo Reservoir Company to construct the three reservoirs. By early summer 1910, a work force was at Trial Lake but was driven away by armies of mosquitos "so thick they would often darken the sky." Toward the end of July a second and larger work force was prepared to commence work.[18]

The company assigned a crew of men, horses, and a superintendent to each of the three lakes. Each crew contained about 25 teams of horses and enough men to control them. Comer Thorton was "the pusher" at Wall Lake; John H. Clegg was in charge at Washington Lake, and William Murdock supervised construction at Trial Lake. Edward Buys was replaced by Edward Clyde, who was responsible for the engineering of all three reservoirs. Much of the work crew consisted of farmers from the Heber Valley.[19]

Wall Lake Dam of Provo Reservoir Sy[illegible]. Construction began on Trial, Washington, and Wall Lake dams in the summer of 1910. Each lake was assigned a work crew consisting of a superintendent, about 25 teams of horses and enough men to control them. (Photograph courtesy of Ardean Anderson, Kamas, Utah, August 6, 1913.)

Forest Supervisor W.J. Pack wrote the district forester on October 12, 1910, informing him that the company had applied for the right to dam from 30 to 40 lakes within the boundaries of the Uinta National Forest, the water from which "would go down the natural channels which empty into the Provo River." The water would irrigate lands lying about 4 miles north of Provo City, and farms extending northwest along the base of the mountain for a distance of about 10 to 15 miles.[20]

Wall Lake Dam outlet channel. Wall Lake is the highest, deepest, and northernmost of the lakes reservoired at the headwaters of the North Fork of the Provo River.

Supervisor Pack passed on Murdock's assurance that the Provo Reservoir Company also proposed to cooperate with the National Forest Service in constructing access roads and telephone line, "as these improvements should be of much value to the Forest Service."[31]

On August 20, 1913, Acting Supervisor Allred issued five special use permits covering the Lost Lake, North Fork, Knight Meadows, Haystack, and Lincoln Meadows drainage systems, in which the majority of lakes were located. However, Allred was premature. The regional office again cancelled the permits, but Joseph Murdock persisted. Acting as reservoir construction manager for the Union Reservoir Company, in October 1914 he informed Forest Service officials that the Provo, Timpanogos, Wasatch, and Sego Irrigation Companies planned to work cooperatively to secure a special use permit, consolidating their water rights in the lakes through the Union Reservoir Company.

On September 30, 1915, a somewhat reluctant district forester finally issued a special use permit for the purpose of "constructing and maintaining reservoirs and storing water for irrigation purposes exclusively."[10] Also on the same date a special use permit to construct storage reservoirs on Washington, Star and Wall Lakes was issued. These permits were approved on the grounds that the companies' beneficiaries were the general public, and that the issuance of such permits would not affect any projects of the U.S. Reclamation Service. The Forest Service, struggling to find the middle ground between private use and public gain as well as a proper definition of "multiple use," decided to allow development of the high-country lakes by semi-private irrigation companies.[11]

Murdock, however, moved faster than the Federal bureaucracy and had already constructed retention structures on three of the larger natural lakes near the headwaters of the Provo River: Washington, Trial, and Wall Lakes. Of these, Washington was the largest. A deep body of water with a gently sloping shoreline covered with conifers, it was the largest and most accessible of the 15 dammed lakes in the upper Provo River drainage. With a crest length of 700 feet, a maximum height of 42 feet, and a crest width of 18 feet, the Washington Lake Dam consisted of compacted earth-fill over a poured-in-

Downstream face and toe of Washington Lake Dam, showing outlet valve. The lake is the largest and most accessible of the fifteen reservoired lakes in the upper Provo drainage. Like Trial Lake, the dam has a concrete core. The unusually steep slope of the walls necessitated hand placement of the riprap stones.

place concrete core, with 18 inches of stone riprap laid over its upstream and downstream faces. The outlet was a 20-inch-diameter, quarter-inch riveted steel pipe, with a slide headgate at the pipe inlet and a 20-inch Ludlow gate valve on the downstream toe. Completion of the dam enlarged the lake size to almost 120 acres, with a 3,035 acre-foot maximum storage capacity and a 32-foot maximum drawdown.[14]

The Provo River originates from Trial Lake, the second largest of the dammed lakes in the drainage. (Photograph entitled, "Construction of Trial Lake Dam of the Union Reservoir Company at 29 feet above outlet." Photograph courtesy of Ardean Anderson, Kamas, Utah, September 7, 1912.)

The Provo River originates from Trial Lake, the second largest of the dammed lakes in the drainage. There, contractors built a pair of medium-scale dams at the natural outlet on the lake's southern end. With a 600-foot-long crest, 40-foot maximum height, and a crest width of 18 feet, the primary dam, like the Washington Lake Dam, consisted of compacted earth-fill over a concrete core, with 18 inches of stone ripraping on its sloped upstream and downstream faces. The outlet was an 18-inch-diameter, quarter-inch riveted steel pipe, with a slide headgate and a 20-inch Ludlow gate valve on the downstream toe. Trial Lake was enlarged to a surface area of 98 acres, with a 2,020 acre-foot maximum storage capacity and a 36-foot maximum drawdown.[15]

Wall Lake, the northernmost of the three lakes, was located at the highest elevation (10,160 feet), and was the deepest (115 feet). It was characterized by an irregular shoreline of talus slopes and scattered conifers. The Wall Lake Dam, an obtuse V-shaped 615-foot structure with a 35-foot height and 16-foot width, was made up of a compacted clay core, covered with earth and rock fill and faced with rock riprap on both slopes. Like the others, the outlet consisted of a 20-inch-diameter, quarter-inch riveted steel pipe with a sliding headgate and Ludlow gate valve. Wall Lake was enlarged to an 85-acre size, with a 3,533 acre-foot storage capacity and a 35-foot maximum drawdown.[16]

Washington Lake Dam, showing timber enclosure for the outlet. (Photograph courtesy of Ardean Anderson, Kamas, Utah, August 1913.)

The three dams, and the majority of those that followed, mirrored those constructed to impound the waters flowing into the Uinta Basin. These small, simple earth-fill structures consisted of a water-barrier central core covered with tons of earth-fill for height and ballast. A stone veneer protected the dams from erosion. The cores of Washington and Trial Lake Dams were poured-in-place concrete; Wall Lake Dam had a compacted bentonite clay core. Crews excavated the necessary earth-fill from nearby open pit operations. The material was then dumped over the cores, compacted and graded using horse- or tractor-pulled scrapers and graders. Finally, workers placed large-scale granite stone riprap, typically laid 1 to 2 feet thick, over the surface of the dam. Trial and Wall Lake Dams both were contoured in this fashion, and the riprap was simply dumped over the earth walls. The walls of Washington Dam, however, slope at an atypically steep 2:1, which necessitated hand placement of the riprap stones to ensure proper consolidation of the dam face. Men, horses (or mules), trucks, or tractors provided the motive power for construction, depending upon accessibility of the dam site.

Construction crews placed an outlet pipe at the base of the maximum section of each dam. Usually, on one end of the dam a concrete overflow spillway was poured in place. This spillway functioned as a release valve for the dam in the event of excessive water accumulation in the lake and served to prevent breaching or overflowing of the retention structure. The flow through this was typically controlled by one or two freeboards, held in place in former grooves in the spillway walls, and raised or lowered by steps.

Twenty-inch-diameter Ludlow gate valve, the downstream outlet valve for Trial Lake Dam.

Washington, Trial, and Wall Lakes were dammed in 1914, and on August 16, 1915, Joseph Murdock asked the Forest Service for permission to increase the height of the dams. R.A. Gery, acting assistant engineer for the Forest Service, withheld permission until a district engineer could make an examination. Accordingly, on September 15, 1915, District Engineer E.W. Krainer reported that the Provo, Timpanogos, Wasatch, and Sego Irrigation Companies had constructed dams on Washington and Trial Lakes. The report added that concrete cores had been used for the two dams and "the earth used for fill was free from vegetation in every case and very suitable with a corrugated galvanized iron outlet pipe with gate valve." The report concluded that "all work appeared to have been substantially performed."[11]

Upstream face of Wall Lake Dam, an oblique V-shaped structure constructed of a compacted Bentonite clay core, covered with earth and rock fill, and faced with granite stone riprap on both slopes.

Kramer plotted the point of diversion from the Provo River used by each of the four irrigation companies. He estimated that the value of the lands irrigated varied from about $60 to $90 per acre, including water. The four companies shared the impounded water rights, with each company allocated ¼ of the water stored in the reservoirs.[10]

The Timpanogos Company used the conduit of the Heber Light and Power Company, which extended approximately 10 miles in a southeasterly direction, to irrigate the higher lands of the Provo Valley. Kramer reported that the Timpanogos Canal had a capacity of 4 to 5 second feet and that the company depended almost entirely on the stored water except during the flood water period. The Wasatch Irrigation Company diverted water from the Provo River at a point about 1½ miles below the diversion of the Heber Power and Light Company and downstream from where the power company returned the water into the Provo River. The irrigation canal was approximately 7 miles long and delivered water to 3,000 to 4,000 acres of land in the vicinity of Heber. Kramer determined that the company "depended very little on stored water" and had a low water right large enough to irrigate almost all of its land which was worth from $100 to $150 per acre.[79]

The Sego Irrigation Company diverted water from the conduit of the Utah Power and Light Company's Olmstead Plant. It had no low water right and depended entirely upon high water and water stored in the high-mountain reservoirs. Kramer estimated that the company irrigated 400 acres on the Provo Bench, located on the north side of the Provo River between the Wasatch Mountains and Utah Lake. The company estimated the worth of the agricultural lands at $100 to $200 per acre.[80]

The Provo Reservoir Company diverted water from the Provo River below the intake of the Olmstead Plant and above the point of return. Kramer was informed by Murdock that "the Provo Reservoir Company has a prior right to the 10 second-feet of the natural flow of the Provo River ahead of the water right of the Olmstead Plant."[81] The reservoir company irrigated land on the Provo Bench valued from $100 to $200 per acre.

The Provo Reservoir Company first turned water through its canal in 1910. It was not until the company had secured an adequate and dependable supply of late-summer water by the construction of the three storage reservoirs that the canal was extended to the large bench on the west side of the Provo River. From the point of diversion, the canal stretched northward through Utah Valley, skirting the foothills of the Jordan Narrows near the point of the mountain. Here, the canal crossed the Jordan River in a 48-inch concrete and 40-inch steel pipe and discharged into two canals. One branch ran south into Salt Lake County to a point west of Murray.[82] The enlargement of the Provo Reservoir Canal was designated the "Jordan Extension."[83]

On April 23, 1915, water was first turned into the siphon which carried it across the canyon at the Jordan Narrows. After the opening, a banquet was held at the Roberts Hotel in Provo. The notable guests feasting on mountain trout and delivering speeches included: John R. Murdock, president of the company, George S. McAllister, representing the manufacturers of Utah; W.E. Hubbard, president of Salt Lake Real Estate Association; J.W. McHenry, president of the United Commercial Clubs of Salt Lake County, Oskar F. Hunter, bishop of the Eighth Ward of the Mormon Church in Salt Lake, George O. Relf, general manager of the Hotel Utah; O.C. Beebe, cashier of the Zion's Saving Bank and Trust Company, Jesse Knight, financial mogul who had backed the enterprise from the beginning, and W.C. Orem, president of the Salt Lake and Utah Railroad Company.[84]

The following day, Joseph Murdock and Francis W. Kirkham represented the company in entertaining prominent citizens of Salt Lake and Utah Counties at the formal opening. Church President Joseph F. Smith proceeded to the intake of the canal where, 5 years before, he and his cousin, second councilor John Henry Smith, turned water into that portion which watered the Provo Bench.[85]

On July 7, 1921, Murdock, other officers and directors of the Provo Irrigation Company, and prominent State and county officials were present when the switch was thrown on the new pumping station located at the Jordan Narrows. The plant was built to augment the flow of water brought down from the mouth of Provo Canyon to the fertile lands lying to the west and south of Salt Lake City—a distance of 40 miles. The twin pumps acted in conjunction with the storage reservoirs located at the head of the Provo River which collected spring overflow and prevented mid-season depletion of the river's waterflow.

According to Murdock, the Jordan Extension Canal and the pumping station received no Federal, State, or church aid, but was financed by "Uncle Jesse" Knight.[46] While Murdock admitted that the company had been involved in litigation with more than 600 individual irrigation companies and corporations since the $2 million project began, he maintained that 90 percent of the suits were compromised.[47] Referring to court rulings, Murdock stated, "We were so successful that we have sustained decrees in every instance."[48]

The Morse Decree of the preceding May—touted as the first litigation made on the physical unity of the stream from its headwaters to its mouth—adjudicated a generous allotment of Provo River water to the Provo Reservoir Company. The decree stipulated that the flow of water be measured in second-feet for irrigation purposes, with each second-foot having a "duty" capable of irrigating a certain number of acres. For example, "Duty 60" indicated that a flow of water of one cubic foot per second (cfs) was sufficient to irrigate 60 acres of land. The Provo Reservoir Company was allocated sufficient "duty" to service 7,000 acres on which "some of the finest homes, schools and church buildings have been built," via its canal, siphon and "deluxe farming system."[49]

In November 1923, W.M. Green, engineer for the U.S. Bureau of Reclamation, and the Utah Water Commission, the corresponding State agency, discussed an equally funded, joint project with Murdock, who was also a member of the State Water Commission.[50] On July 3, 1924, the Provo Reservoir Water Users Association, the largest capitalized company to date in Utah County, filed articles of incorporation with the county clerk. Joseph Murdock headed the corporation; his son Royal was the secretary-treasurer. Abel John Evans, J.W. Gillman, Parley Austin, James N. Anderson, R.D. Wadley, Ben C. Lott, and A.O. McMullin were directors.[51]

The property of the corporation consisted of the following: 15.7598 cfs of Class A water rights as defined in Civil Action No. 2883 in the Fourth District Court; 11.6234 cfs out of Applications No. 1828 and No. 3134 for appropriated water filed with the state engineer's office; and 78.2739 cfs of high-water, water rights applications. The corporation's capital stock was divided into 30,000 shares of water stock and the irrigation system was divided into 2 divisions, the Provo and the Jordan. The Provo division was, in turn, divided into the Alpine and Orem Districts with the reservoirs located in the Alpine District.[52]

In light of the anticipated Federal assistance, the corporation proposed to extend the Provo Reservoir Canal from the point of the mountain to the Fort Douglas Military Reservation, thus furnishing water to the eastern part of Salt Lake Valley. The canal would be 33 miles long and capable of irrigating 50,000 acres in Utah and Salt Lake Counties. In reality, the canal extension died on the planning table.[53]

Although the Bureau of Reclamation's Provo River Project would deliver more water into the Utah Valley, it was not approved by the Secretary of the Interior until 1935, and actual construction commenced in 1938. In the interim, the Provo Reservoir Company, along with the various other companies owning water in the high-country lakes, busied themselves with damming and enlarging them as storage reservoirs.

In addition to those built on Washington, Wall, and Trial Lakes, the Provo Reservoir Company had constructed dams on Crystal, Star, Teapot, and Lost Lakes by May 1923. Long and Island Lakes had only small rock and dirt dams. In 1923, a dam was constructed on Long Lake for the purpose of storing irrigation water. The Long Lake Dam and secondary dike were situated across the lake's natural drainage at its southern tip. Like the three dams built in 1914, both structures at Long Lake featured typical earth-fill construction, with compacted clay cores, and rock riprap on the sloping upstream and downstream faces. Construction of the 342-foot-long, 26-foot-high dam increased the surface area of Long Lake to 55 acres. With a 23-foot maximum vertical drawdown, the dam had a maximum active storage capacity of 975 acre-feet. The outlet works consisted of a 24-inch-diameter corrugated iron ingot pipe with 4 inches of concrete sheathing. An inclined 18-inch Hardesty sliding headgate was fitted at the outlet's upstream end. Workers poured a double-gated concrete overflow spillway on the eastern end of the dam, to which was attached 4-foot freeboards.[19]

Downstream face and toe of primary dam on Long Lake. Both the dam and a secondary dike are located at the lake's southern tip.

The Provo Reservoir Company constructed a new dam on Lost Lake in 1926. A small rock and earth dam had been built by 1923 to impound water on the lake. The reservoir company contracted with the Clyde and Whiting Company of Springville, Utah, to erect a large earthfill dam and separate dike across the lake's south and east drainages. Using more than 60 men, 8 teams, and several large trucks, the construction firm built the retention structures for approximately $26,000. The dam and dike were built with compacted clay cores, covered with earth-fill which was graded to a 1:1 slope and faced with hand-placed stone riprap 3 feet thick. With an aggregate crest length of 1,820 feet, a maximum height of 25 feet, a maximum base thickness of 88 feet, and a crest width of 16 feet, the Lost Lake Dam and dike were the largest of the earth-fill structures built over the natural lakes in the upper Provo River drainage. They represented a considerable investment by the reservoir company and substantially increased the holding capacity of the lake.[20]

Construction at Lost Lake Dam showing loading platform. Lost Lake dam is the largest of the earth-fill retention structures. Construction required more than 60 men, 3 teams, and several large trucks. (Photograph courtesy of Arleen Anderson, Kamas, Utah, September 7, 1932.)

Almost 1,500 acre feet of water were impounded in Lost Lake Reservoir, which was officially accepted by Provo City in September 1926, when Commissioners Charles Hopkins and W.P. White inspected the site. One thousand acre feet of the stored water belonged to the city, to be used for exchange purposes for the water from springs, and the remainder was owned by the Provo Reservoir Company.[14] In July 1931, Provo City let a contract to heighten Lost Lake Dam in order to gain additional storage capacity. E.V. Palfreyman, a Provo contractor, submitted the low bid of $32,985 for dam, dike, and 5,000 cubic yards of riprap facing.[15]

No other dams were built until a drought in 1931 sparked a renewed interest in high-country reservoir construction. As the larger lakes had already been dammed, attention was now turned to the smaller, more marginal mountain lakes for storage capacity. The Timpanogos Irrigation Company was particularly hard-pressed to provide water to its downstream users and required additional high-mountain storage capacity. In the spring of 1932 the company sent a number of men and horse teams to Island Lake for the purpose of constructing a dam. They were warned by the Forest Service not to begin until they were issued a special use permit, as the stipulations of the 1915 permits had not been complied with, rendering them invalid.

In September 1934, the Provo Reservoir Company applied for National Forest special use permits on Teapot and Island Lakes. Applications for water rights (No. 2077G and No. 2077B) for the two lakes had been filed with the Utah State Engineer in 1909 and approved on December 24. Specifications for dam construction were submitted to the Forest Service in July 1934. Acting Regional Forester Dana Parkinson wrote the forest supervisor on October 1, 1934, informing him that Island and Teapot Lakes should not be approved for reservoirs, as they had far higher values for recreation. Furthermore, Parkinson believed it would be "foolish to reservoir that lake (Island) when there is no water running out under present conditions." Adding a touch of sarcasm, he added, "If this is a sample of the type of lake they [Provo Reservoir Company] plan on reservoiring, it would seem that they would be more justified to making more thorough examinations before going ahead."[illegible]

Despite the Forest Service's initial objections, both lakes were dammed in 1934. Located at the head of the North Fork of the Provo River above Duck and Fire Lakes, Island Lake is characterized by shorelines of rocky cliffs, grassy meadows and stands of timber. The lake in its natural state overflowed into a smaller pond, the outlet of which was also dammed by the reservoir company. Island Lake was both lowered below the natural level by a ditch and raised by a dam to increase its storage capacity and control the water flow. The dam typified small-scale earth-fill construction, with stone riprap placed on the sloping upstream and downstream faces. A 12-inch Hardesty Model 112 circular headgate regulated water through the corrugated steel outlet pipe, and a poured-in-place concrete spillway drained the overflow. The dam increased the lake's storage capacity to 460 acre-feet and its surface area to 30.4 acres.[illegible]

Concrete spillway with flashboards removed at Fire Lake Dam. Poured in-place concrete spillways were commonly constructed for Utah's high mountain reservoirs.

The fifth smallest among the 15 dammed lakes, Teapot Lake, is characterized by a gently sloping shoreline with grassy meadows and coniferous forests. The lake was impounded by two small dams across the natural outlets on the east and southeast corners. With an aggregate length of 120 feet, the dams were composed of a compacted earth core, covered with 18-inch stone riprap facing on the sloped dam walls. The northern dam contained the outlet: a 12-inch diameter corrugated steel pipe with a Hardesty Model 100 headgate.[40]

In 1934, the Provo Reservoir Company dammed the natural outlets of Weir and Fire Lakes. Built from similar designs and specifications, they were distinguished from the other dams in the Upper Provo drainage in their construction technique. Unlike the rudimentary earth-fill structures on the other lakes, the Weir Lake and Fire Lake Dams were built using fieldstone rubble masonry for the upstream faces. The granite stone on the vertical walls of these were fitted and laid with Portland cement joinery. The downstream faces of the two dams featured a more conventional sloped earth configuration and were covered with hand-placed stone riprap. The larger of the two reservoirs with a surface area of 12.4 acres, Fire Lake was a scenic water body with a steep, rocky shoreline dotted by conifers. The 240-foot long dam was picturesquely placed over the southeast outlet on smooth, sloping, glaciated bedrock with its downstream toe almost on the lip of a ledge. The dam outlet consisted of a reinforced concrete box culvert; the outlet gate was a standard Hardesty cast iron sliding gate secured to the culvert by a 12-guage pipe embedded in the concrete. A double-gate concrete spillway on the dam's west edge was situated on quartzite ledge rock.[41]

Upright outlet gate, wheel, stem, and stem guide at Lost Lake Dam.

Upright outlet gate, stem, stem guide, and wheel at Weir Lake Dam. Weir and Fire Lake reservoirs featured a grouted fieldstone masonry upstream face and loose hand-placed rock on the downstream slope of the retention structure. Weir, Fire, and Pot Lake Dams were all built by the Provo Reservoir Company in 1934 in response to the drought of 1931.

The second smallest among the dammed lakes in the upper Provo River drainage, Weir Lake was an irregularly shaped natural body of water with a steeply sloped and timbered, rocky shoreline. The small stream that drained Long Lake flowed into Weir through a marsh at its northern end. The Weir Lake Dam was built with a crest length of 248 feet, a maximum height of 15 feet, a crest width of 3 feet, and a base thickness of 27 feet. Like the Fire Lake Dam, the outlet gate on Weir was a standard Hardesty cast iron slide gate secured by a 12 guage pipe embedded in the concrete outlet culvert.

Log barricades were constructed upstream from the concrete overflow spillways of the two dams to protect them from floating logs. The dam increased the surface area of Weir Lake to 14 acres; its maximum capacity was increased to 110 acre-feet.[32]

Although the gain in storage capacity was negligible, the Provo Reservoir Company also dammed diminutive Pot Lake in 1934. A picturesque body of water with a rocky shoreline dotted by scattered timber, Pot Lake is the smallest of the 15 reservoired mountain lakes. Sixty feet long and only 8 feet high, the Pot Lake Dam consisted of the typical clay core, covered with compacted earth-fill graded to a 1:1 slope and faced with hand-placed rock riprap. The outlet was a 12-inch-diameter corrugated iron pipe with an inclined Hardesty sliding headgate.[33]

Creating the last privately built reservoirs on the upper Provo River drainage, the Timpanogos Irrigation Company built dams on Marjorie and Duck Lakes in 1935. The company used similar construction specifications for each of the dams. Both dams had center cores of selected clay and earth, upon which was placed a compact mixture of earth, clay, and gravel and the faces were covered with rock riprap. Because the upstream and downstream faces sloped at a 2:1 angle, the riprap was "carefully placed by hand so as to insure the greatest density and stability for the structure, the largest stones being kept

Marjorie Lake Dam crest and upstream face.

near the outer faces and the smaller fragments along the inner faces."[54] The longer of the two retention structures, the Marjorie Lake Dam more than doubled the surface area of the shallow lake to 27.3 acres. It was shaped like an obtuse V and had a crest length of 940 feet, a maximum height of 25 feet, and a crest width of 13 feet. The Duck Lake Dam was 560 feet long, 19 feet high, and 11 feet wide at the crest. It increased the size of the lake to 32.6 acres, with a 353 acre-foot maximum capacity and a 16-foot vertical maximum drawdown.[55]

Embedded at the maximum section of each dam was a 15-inch-diameter, standard reinforced concrete bell and spigot outlet pipe, with a spillway located upon quartzite ledge rock. To each outlet was attached a 15-inch standard cast-iron Hardesty slide headgate, placed at the upper end of the outlet culvert and embedded in concrete. On the north end of the Duck Lake Dam and the east end of the Marjorie Lake Dam, the contractors poured concrete overflow spillways, each fitted with a 2-foot freeboard.

The construction of these dams in the Provo River drainage signaled a remarkable accomplishment. Located high in the mountains some 60 miles from the intake of the company's canal and almost 100 miles from the rich farmlands that they irrigated, they represented a sizeable investment in both capital and time. Although not particularly innovative in their construction or operation, these small-scale structures completed an integrated system of water storage. Combined, they represented a technologically successful solution to the impoundment of mountain runoff for agricultural use.

For Joseph Murdock and the Provo Reservoir Company, the dam's price was high. The success of his entire enterprise in the Provo Valley depended upon the acceptance of his interpretation of the term "surplus water." Murdock had defined this as "all water in a river that is not being applied to beneficial and economical use," and was therefore "subject to appropriation, even though a careless or wasteful use of water might consume the entire flow of a stream." He spent years in litigation fighting hundreds of lawsuits to support his claim before arriving at a compromise agreement with the established Provo River water users. To build the retention structures in this remote location and to connect them with an existing system necessitated extensive physical labor, which increased their construction costs substantially. As a result, the cost of water storage in this system was relatively expensive, ranging from $6 to $20 per acre-foot. The great distance from the headgate on the Provo River to the irrigated fields involved the construction of a lengthy canal that required numerous bridges, culverts, and flumes. Acquiring the right-of-way for this canal across miles of improved farm and city property, through existing orchards, and even between houses and barns, added more to the construction expenses.[56]

Finally, the company found that patrolling some 60 miles of heavily apportioned river between its dams and its headgate was almost impossible. Ironically, the same difficulties in measuring and regulating water flow that Joseph Murdock and the Mormons had used to effect in appropriating Uinta Basin water from the Indian Irrigation Service plagued him along the Provo River. Farmers and other irrigation companies, accustomed to diverting the entire flow of the river during the low-water season, controlled numerous headgates and dams along the river in the lower valleys, and often took water which Murdock had claimed. With only primitive measuring devices and crude regulating structures, the Provo Reservoir Company could not obtain reliable data to document its losses. For years, the company faced what its Chief Engineer Clarence Jarvis called the "innate prejudice felt by the owners of old water rights against the new applicants that cause a change in the regulations of the river."[57]

Mormon farmers used the impounded water to irrigate about 8,000 acres in Utah County and 8,000 more in Salt Lake County. In 1915, the company could deliver in excess of 100 second-feet of water through its feeder canal, supplied in part through the release of impounded flow from Washington, Wall, and Trial Lakes. This land included some of the most productive acreage in the region, well situated along rail lines for transportation to and from market. By drawing "surplus water" from the Provo River and impounding mountain runoff near the river's source, the company provided water necessary for modest twentieth century agricultural expansion from the Provo Bench to the Bull River Canal north of Lehi Junction.

Inclined outlet gate, wheel, stem, and stem guide at Duck Lake Dam.

ENDNOTES

[1] Quoted from Mannus J. Jensen, *History of Provo, Utah* (Provo: New Century Printing Company, 1924), pp. 18-21.

[2] William R. Palmer, "Indian Names in Utah Geography," *Utah Historical Quarterly*, Vol. I (January 1928), p. 14.

[3] John Clifton Moffitt, *The Story of Provo, Utah* (Provo: Press Publishing Company, 1975), p. 75.

[4] Jensen, *History of Provo, Utah*, pp. 28-29.

[5] Moffitt, *The Story of Provo, Utah*, p. 78.

[6] Leonard J. Arrington, "The Deseret Agricultural and Manufacturing Society in Pioneer Utah," *Utah State Historical Quarterly*, Vol. XXIV (1956), p. 165.

[7] Jensen, *History of Provo, Utah*, p. 63.

[8] Ibid., p. 85.

[9] An Act to Incorporate the Provo Canal and Irrigation Company, Sec. 2, dated 17 January 1853, Provo City Metropolitan Water District Office, Provo, Utah.

[10] Remarks by President Brigham Young made in the Bowery, Great Salt Lake City, 8 June 1856, *Journal of Discourses*, Vol. 3 (London: Orson Pratt, 1956), pp. 328-331; Susa Young Gates and Leah D. Widstoe, *The Life Story of Brigham Young*, (New York, 1930), p. 132.

[11] Utah Stake Historical Record, p. 217, found in "Cultural Resources Class I Survey of the Central Utah Area: Utah Water Development History Research Unit," Vol. IV, p. 7 (unpublished report by Alec Avery and David Singer within the Bureau of Reclamation Library, Denver, Colorado).

[12] Utah Stake, Series II, General Meeting Minutes, 29 May 1856, found in "Cultural Resources Class I Survey of the Central Utah Area," p. 7.

[13] Utah Stake Historical Record, Book 64904, 6 July 1878, found in "Cultural Resources Class I Survey of the Central Utah Area," p. 7.

[14] Jensen, *History of Provo, Utah*, pp. 244-246.

[15] This account is based on Craig Woods Fuller, "Development of Irrigation in Wasatch County" (Utah State University, M.A. Thesis in History, 1973), pp. 73-76, 90-91.

[16] Amendatory Regulation of U.S. Department of Interior dated 25 April 1906, Washington Irrigation Company Reservoir (Big Elk Lake) File (D-3), W-CNFSO, Federal Building, Salt Lake City, Utah. Hereafter cited as Wasatch-Cache National Forest Supervisor's Office, W-CNFSO.

[17] "Stipulations for Reservoir Use," Washington Irrigation Company Reservoir File, W-CNFSO, Federal Building, Salt Lake City, Utah. The first dam undertaken in the Provo Basin, by 1914, the irrigation company had spent $8,000 reservoiring Big Elk Lake and estimated it would spend $4,000 more before it finished the project. Dam construction was completed in 1918. Situated picturesquely 10 feet from a precipitous rock ledge, the 300-foot-long dam was 29 feet wide at its crest. It features typical earth-fill construction, with handplaced rock riprap on its sloped faces and an 18″ × 24″ concrete

box outlet with an inclined headgate. An overflow spillway has been blasted in the ston at the dam s southern end. The lake was increased to 43 acres, with 2,062 acre-feet maximum storage capacity and a 25-foot maximum drawdown.

[8] Jensen, *History of Provo, Utah*, pp. 244-246.

[9] Craig Fuller, "Beyond the Wasatch Mountains" (HAER Overview, NPS, 1983), p. 17.

[10] Moffitt, *The Story of Provo, Utah*, p. 54.

[11] Andrew Jenson, *Latter-Day Saint Biographical Encyclopedia*, Vol. IV, (Salt Lake City: Andrew Jenson Memorial Association & Deseret News Press, 1936), p. 658.

[12] Ibid., Vols. I-IV.

[13] Andrew Jenson, assistant church historian, *History of the Scandanavian Mission*, (Salt Lake City, Deseret News Press, 1927), p. 304.

[14] *Members of the Willie and Martin Handcart Companies of 1856: A Sesequicentennial Remembrance* compiled by Susan Wark Easton, 1983. Archives, Genealogical Department, Church of Jesus Christ of Latter-day Saints, Salt Lake City, Utah.

[15] "Memorandum of Facts, dated 9 August 1926, Provo Reservoir Company Files, W-CNFSO, Federal Building, Salt Lake City, Utah.

[16] Joseph R. Murdock, President of Provo Reservoir Company, Correspondence to W.J. Pack, Supervisor Uinta Forest Reserve, 20 June 1910, Provo Reservoir Company Files, W-CNFSO, Federal Building, Salt Lake City, Utah.

[17] Fuller, "Development of Irrigation in Wasatch County," pp. 77-79.

[18] Ibid.

[19] W.J. Pack, Forest Supervisor, Correspondence to District Forester, 12 October 1910, Provo Reservoir Company Files, W-CNFSO, Federal Building, Salt Lake City, Utah.

[20] Joseph R. Murdock, Correspondence to Forest Supervisor, 23 November 1909, Provo Reservoir Company Files, W-CNFSO, Federal Building, Salt Lake City, Utah.

[21] Application for Special Use Permit, approved and dated 30 September 1915, Provo Reservoir Files, W-CNFSO, Federal Building, Salt Lake City, Utah.

[22] J.L. Lytel, U.S. Reclamation Service Project Engineer, Correspondence re: Special Use Permit dated 1 June 1910, Provo Reservoir Company Files, W-CNFSO, Federal Building, Salt Lake City, Utah.

[23] Andrew Jenson, *Latter-Day Saint Biographical Encyclopedia*, Vol. I (Salt Lake City: Andrew Jenson Memorial Association and Deseret News Press, 1936), p. 361; Frank Esshom, *Early Mormon History, Pioneers and Prominent Men of Utah: Portraits 1847-1868* (Salt Lake City: Western Epics, Inc., 1966), p. 85.

[24] "Preliminary Engineering Report: Stabilization of High Mountain Lakes, Provo River Drainage," (National Forest Service Report, 1969), p. 67.

[25] Ibid., p. 57.

[36] Ibid., p. 62.

[37] E.W. Kramer, "District Engineer's Report on the Application of the Provo, Timpanogos, Wasatch and Sego Irrigation Companies," Salt Lake City, 1915, Provo Reservoir Company Files, W-CNFSO, Federal Building, Salt Lake City, Utah.

[38] Ibid.

[39] Ibid.

[40] Ibid.

[41] Ibid.

[42] Jensen, *History of Provo, Utah*, p. 252.

[43] Preamble and Resolutions, Provo Reservoir Company, adopted 7 May 1914, pp. 1-2, Provo Reservoir Files, W-CNFSO, Federal Building, Salt Lake City, Utah.

[44] *The Salt Lake Herald Republican*, 24 April 1915.

[45] Ibid.

[46] *Salt Lake Tribune*, 12 July 1921.

[47] Ibid.

[48] *Deseret News*, 12 July 1921.

[49] *Salt Lake Tribune*, 12 July 1921.

[50] *Salt Lake Tribune*, 16 November 1923.

[51] *Journal History of the Church of Jesus Christ of Latter-Day Saints*, 5 July 1924, BYU Americana Collection, microfilm index, p. 3.

[52] Ibid.

[53] Royal J. Murdock, secretary of Provo Reservoir Company, correspondence to Dana Parkinson, Forest Supervisor, Wasatch National Forest, 9 August 1923, Provo Reservoir Company Files, W-CFNSO, Federal Building, Salt Lake City, Utah.

[54] "Preliminary Engineering Report: Stabilization of High Mountain Lakes, Provo River Drainage," (National Forest Service Report, 1969), p. 29.

[55] *Salt Lake Tribune*, 12 July 1926.

[56] Ibid.

[57] *Salt Lake Tribune*, 15 July 1931.

[58] Dana Parkinson, Acting Regional Forester, Correspondence to Forest Supervisor, 1 October 1934, Provo Reservoir Company File for North Fork Lake No. 4 (Island), W-CNFSO, Federal Building, Salt Lake City, Utah.

[59] "Preliminary Engineering Report: Stabilization of High Mountain Lakes, Provo River Drainage," (National Forest Service Report, 1969), p. 24.

[60] Ibid., p. 24.

[61] Ibid., p. 54.

[62] Ibid., p. 72-73.

[63] Ibid., p. 46.

[64] Specifications for Dam and Spillway for North Fork No. 6 under Application No. 2077-D, A-12226 (2077-F), Timpanogos Irrigation Company, August, 1934, Timpanogos Irrigation Company Reservoir File, North Fork No. 6 (D-3), W-CNFSO, Federal Building, Salt Lake City, Utah.

[65] Specifications for Dam and Spillway for Marjorie Lake Reservoir under Application No. A-12225 (2077-G), 2077-I, August, 1934, Timpanogos Irrigation Company File (D-3), W-CNFSO, Federal Building, Salt Lake City, Utah.

[66] Clarence S. Jarvis, "Provo Reservoir Company's Irrigation Project," *Engineering News*, 26 August 1915, pp. 394-95.

[67] Ibid.

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